

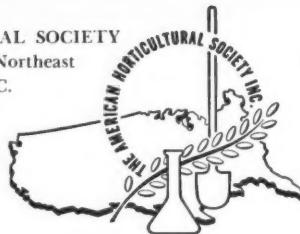
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The National
HORTICULTURAL
Magazine

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Original papers increasing the historical, varietal, and cultural knowledges of plant materials of economic and aesthetic importance are welcomed and will be published as early as possible. The Chairman of the Editorial Committee should be consulted for manuscript specifications.

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GOTTSCHO-SCHLEISNER

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Publications available from the American Horticultural Society

THE AZALEA BOOK

Frederic P. Lee. Published by D. Van Nostrand Company, Inc., Princeton, New Jersey and sponsored by the Society. 1958. 324 pages, 6 pages illustrated in color, 56 black and white illustrations. Cloth bound. \$6.45, postpaid, special price to Society Members; \$8.95, postpaid to non-members.

This handsome and unique book tells everything there is to know about azaleas, from setting out a few plants and keeping them healthy in a backyard garden to identifying rare specimens through a descriptive list of about 70 species and 3,000 varieties.

HANDBOOK OF HOLLIES

Harry William Dengler, Guest Editor and 26 contributors in various fields of holly growing. 1957. 193 pages, 1 color illustration and 61 pages of black and white. Paper bound. \$3.00, postpaid.

Descriptive list of the North American, Oriental, and English species and varieties of hollies with their care and uses—planting, pruning, pests, diseases, propagation, hybridizing, landscape use, hedges, screens, barriers, topiary, bonsai, orcharding and cut arrangements.

ANNIVERSARY ISSUE

A selection of a few of the classical articles that appeared in the previous 34 volumes of *The National Horticultural Magazine*. October 1955. 113 pages. *Franklinia alatamaha* illustrated in full color on the cover, 71 black and white illustrations. Paper bound. \$1.00, postpaid.

Liberty Hyde Bailey's "The Joy of Growing Plants" commences the issue, followed by: The Gentle Art of Weeding, Roscoea, Some Californian Flowering Shrubs, Neglected Native Plants, The Stewartias, Kalanchoes for the Window Garden (19 species illus.), Franklin's Tree, Lewisia, Trilliums (11 species illus.), Notes on Calochortus (14 species illus.), and Erythroniums—all written by prominent names of horticulture.

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R. MELOCHE, Montreal Botanical Garden

Trichantha minor

A newly discovered member of the Gesneriaceae
See Page 173.

Mycorrhizae

what they are

what they do

EDWARD HACSKAYLO*

Frequently plants growing naturally in soil have absorbing roots that are invaded by very specific non-pathogenic fungi that cause unique changes in the root structures. In 1855 A. B. Frank, a German forester, coined the term mycorrhiza (meaning fungus-root) to designate these non-pathogenic invasions of roots by fungi. Studies by many investigators thereafter have revealed that the fungi in some mycorrhizae are very efficient in absorbing nutrients from poor soils for their hosts and in return receive nourishment from the roots, a mutually advantageous relationship. In other mycorrhizae some of the fungus cells may be digested by the root's cells, seemingly a somewhat one-sided affair. These interactions are better understood, however, if one has a knowledge of how mycorrhizae are formed and of what they look like.

On the basis of the interrelation between the thread-like filaments of fungus hyphae and the root cells, mycorrhizae are classed into two main groups, ectotrophic and endotrophic. The kind is usually specific for the genus of the higher plant on which it occurs.

Ectotrophic mycorrhizae are produced by the invasion of actively growing absorbing roots by fungi of the types which with few exceptions produce fruiting bodies called mushrooms. The hyphae of these fungi form a compact mantle on the surface of the roots and secrete enzymes that permit invasion only between the cells of the cortex (Figure 1). There is no penetration by hyphae into the growing tip or vascular system of the root. The infected roots are shorter than the uninfected ones; sometimes they are branched once to many times (Figure 2) and do not develop root hairs. The root branches and the fungus hyphae radiating out in all directions greatly increase the absorbing surface of the roots. Ectotrophic mycorrhizae are commonly found on pine, spruce, oak, elm, beech, birch, chestnut, hickory, and many other woody species.

Endotrophic mycorrhizae are produced by the invasion of absorbing roots by hyphae of certain fungi that do not produce mushroom-type fruiting bodies. The hyphae are present on the root surfaces only as individual threads and penetrate directly into the root hairs and other cells of the epidermis. Penetration of the cells sometimes extends into the root no farther than the epidermis; frequently, however, the hyphae grow into the cortex cells (Figure 3). Like ectotrophic mycorrhizae, endotrophic mycorrhizae do not penetrate the growing tip or vascular tissues. The gross appearance of the roots may remain unchanged or the roots may become beaded (Figure 4), the beading

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probably being caused by periods of arrested growth of the roots followed by periods of active growth as the result of changes in environmental conditions such as the soil moisture level in the zone of the invaded roots. Endotrophic mycorrhizae are commonly found on tulip poplar, maple, sweet gum, azalea and other ericaceous genera, orchid, and the majority of herbaceous plants.

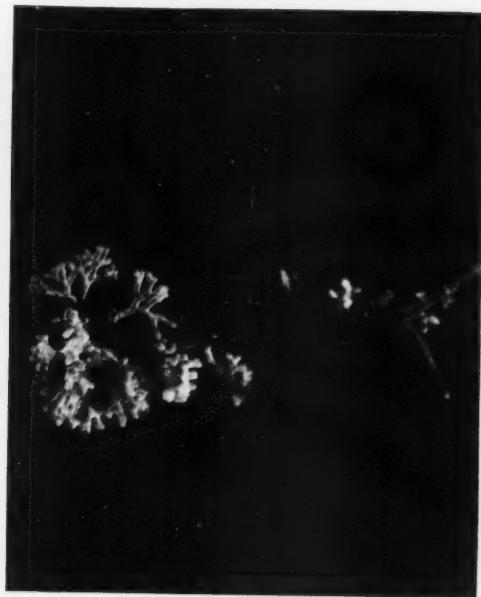
Since the latter part of the nineteenth century investigators of the physiology of mycorrhizal associations have sought their significance and an understanding of the mechanisms involved. In Europe there was considerable controversy; one group postulated that mycorrhizae are beneficial and another considered them to be at most invasions by innocuous parasites and therefore of no value to the host. Their conclusions, however, were based on observations of naturally occurring structures.

After the turn of the century N. Bernard in France began to report his findings as to the physiology of orchid mycorrhizae; among his findings is the fact that tuber formation would take place only after the entrance of mycorrhizal fungi. Later studies by several investigators determined that in nature nearly all orchids are invaded by mycorrhizal fungi and that specific fungi are necessary within the seeds to supply enzymes that transform insoluble stored food materials into soluble usable compounds. Thereafter the immature embryo completes its development, and germination is possible. The current technique of germinating orchid seeds on nutrient agars furnishes readily available nutrients that are provided in nature by the fungus-caused digestion within the seed.

With the advent of pure-culture techniques for growing tree seedlings and inoculating them with mycorrhizal fungi in 1921, Professor Elias Melin at Uppsala, Sweden, started a new and very important trend in studies on mycorrhizae. Melin was mainly interested in mycorrhizae of pine and studied the physiology of the association under very carefully controlled conditions ever since. Because of his researches we are now able to identify many of the fungi that cause ectotrophic mycorrhizae. He determined many of the physiological requirements of mycorrhizal fungi and studied extensively their interactions with tree roots. In recent years, by using radioactive tracers, he and his co-workers provided positive proof that mycorrhizal fungi absorb nutrients from the substrata and translocate these nutrients into the root tissues in far greater quantities than root hairs do. When soil fertility is low, shoots of plants having ectotrophic mycorrhizae have far greater amounts of nitrogen, phosphorus, calcium and sodium than do non-mycorrhizal plants. Melin and his coworkers further proved that radioactive carbon dioxide was photosynthesized into food material in the shoots, translocated to the roots, and utilized by the mycorrhizal fungi. Hence the long-debated significance of the reciprocal exchanges between host and fungus was firmly established as a mutually advantageous relationship rather than a one-sided one. The many reports of the need to establish mycorrhizae by soil inoculation when pine seedlings are introduced into new regions lacking the appropriate fungi support these experimental results.

That available mineral elements in the soil have a profound effect on mycor-

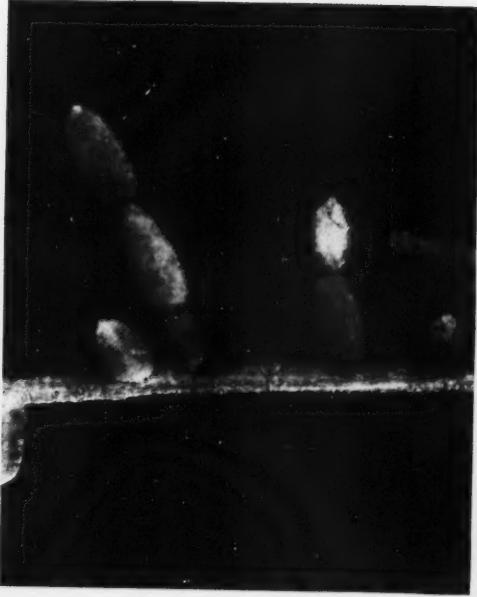
1. *Cross-section of an ectotrophic mycorrhiza of Virginia pine, illustrating penetration of hyphae between cells of the cortex that gives the appearance of very heavy partitions.*
2. *Greatly branched ectotrophic mycorrhizae of Virginia pine.*
3. *Longitudinal section of an endotrophic mycorrhiza of red maple, illustrating penetration of hyphae to the inside of cortex cells.*
4. *Beaded form of endotrophic mycorrhiza of red maple.*



1

2

3



rhizal formation when other factors are optimal is an interesting and practical aspect of the ectotrophic mycorrhizal association. The formation of ectotrophic mycorrhizae varies inversely with soil fertility. Thus mycorrhizae tend to be present in larger numbers when phosphorus, nitrogen, and potassium are not readily available in the soil. Mycorrhizal formation is most profuse and the mycorrhizae are most effective in stimulating the growth of trees in soils that accumulate large amounts of humus and consequently have low amounts of soluble nutrients. Addition of inorganic fertilizers to soils may completely suppress ectotrophic mycorrhizae. In Sweden it is recommended that tree seedlings be fertilized sparingly to permit mycorrhizal formation if the trees will not be fertilized after being transplanted to a permanent site. High rates of application of fertilizer produce larger stocks but few mycorrhizae and, later when no longer fertilized at their permanent site, the plants may become stunted or die.

Since little more than morphological studies have been made on most species having endotrophic mycorrhizae, the physiological aspects of the relationship are not well established. It has been observed, however, that the fungi that invade the root cells follow internally the advancing growing root tip and grow from cell to cell. The older hyphae of the fungi are then digested by the root cells and probably the contents of the hyphae are assimilated by the host. Cytochemical studies may be used in the future to assist in determining the physiological interactions.

Mycorrhizae of trees develop most extensively in acid soils, probably because the fungi, at least those studied so far, all require an acid medium. It has frequently been postulated that the acid soil requirements of many species of plants, such as some azaleas and rhodo-

dendrons, are really the requirements of their mycorrhizal fungi. This has not been definitely proved, but information regarding the effects of acidity on endotrophic mycorrhizal fungi is important and deserves more attention.

In recent years there has been much emphasis on control of soil-borne pathogens by application of chemicals to the soil. Some chemicals, if used in high concentrations, can eliminate pathogens and other microorganisms including mycorrhizal fungi. In addition to eliminating harmful organisms they reduce competition for nutrients and larger seedlings result. In such a case the reaction of the seedlings would be the same as in the fertilized, pre-transplant site. Some of the chemicals may reduce the population of organisms and prevent serious losses of seedlings but do not kill enough of the mycorrhizal fungi to prevent their redistribution in the soil and on the roots. The soil treatments most widely used at present seem to do the latter.

Inoculation of soils with appropriate mycorrhizal fungi has been found necessary for growing certain trees in some prairie soils of the United States. In most areas, however, natural inoculation appears to occur on native species and thus the mycorrhizal association is established. Fungi forming mycorrhizae are known to vary in their physiological requirements and therefore may be expected to vary in their efficiencies in the mycorrhizal associations. Research designed to select the most efficient fungus associates for the different species of plants for use in various soils might result in improved culture. Though complicated and requiring the development of new techniques, physiological studies should be performed both under controlled laboratory conditions and in the field to clarify further the functions of mycorrhizae.

The Botanical Garden of Indonesia

J. A. SCHUURMAN

Not more than forty miles from Djakarta, the Indonesian capital, a crowded city of three million inhabitants, lies the little town of Bogor, which harbors a magnificent botanic garden, a mecca of visitors to Java. Day after day one can see both Indonesians and foreigners roaming through the grounds, admiring their artistic layout, enjoying the grandeur of the lofty avenues, and marvelling at the variety of plants brought together from all tropical countries. Few of these visitors realize that this beautiful spot is the nucleus of a scientific institution of the first magnitude, the *Lembaga Pusat Penjelidikan Alam* (Central Institute for Nature Research). This Institute comes under the Indonesian Department of Agriculture and consists of 16 divisions (called *lembaga*)—the oldest tracing its origin back to 1817, the latest dating from 1956. Some of its divisions are here described.

The original Government Plant Garden ('s *Lands Plantentuin*) was established on April 15, 1817, by a Decree of the Governor General on a site made available by him near his palace at Buitenzorg (as Bogor was formerly called). From the beginning the garden was intended to be a scientific institution, although the growing of plants for utilitarian purposes was not lost sight of. Later it was deemed expedient to devote a separate area to the study of economically important plants. Thus, in 1876, the *Cultuurtuin* (economic cultivation garden) was established at Bogor in a different location, with its own technical center. Although it does not form a part of the Institute, the Botanic Garden cooperates in every way towards the study of medicinal and economic botany.

Following additions of land made in 1892 and 1927 the garden proper now occupies 265 acres including 60 acres for the palace garden and a deer park.

Between 10,000 and 12,000 inventoried plants are at present in cultivation in the garden. As a rule each species is represented by several specimens. Emphasis is on the native Indonesian plants and especially the woody species, so abundant in the tropics. Since many of the trees are more than a century old the garden creates the impression of a grandiose park through which the Tjiliwong (Liwong river) gracefully winds its way.

Large ponds adorned by water lilies and other aquatics, avenues of tall *Canarium* trees, a world-famous orchid-house, a plant sales department, and a roost of flying foxes (giant fruit bats), are a few of the attractions which interest the general public. The visiting botanist or horticulturist is attracted by the special collections for which the garden is famed—palms, bamboos, and pandans, to mention but a few.

Bringing all the native plants of Indonesia together at Bogor would be impossible. The island archipelago is so vast in its over-all extent and embraces so many climates that all plants could not possibly be cultivated in any one place. Therefore long ago the suggestion was made that there be established subsidiary gardens in other parts of Indonesia.

As early as 1852 a subsidiary Garden was opened at Tjibodas initially as a Government Cinchona Plantation. It was, however, transformed into a Botanical Garden in 1867. This Mountain Garden is situated at an altitude of 4,200 feet on the slope of Mount Gedeh, 40 miles inland from Bogor. It comprises 200 acres, and 3,000 acres in the adjacent forest reserve. It has its own laboratory, library, herbarium and guest house. Another subsidiary garden was started in 1914 at Sibolangit, 30 miles west of Medan in Eastern Sumatra. It



Mature trees with buttressed roots in the Bogor Botanic Garden



Asplenium nidus, the Bird Nest Fern, in the Branch
Botanic Garden at Tjibodas



has an area of 60 acres with a forest reserve of 250 acres. At the present time it is temporarily closed to the public. A third subsidiary garden consisting of 210 acres and dating from 1941, is situated at Purwodadi in Eastern Java. Finally, in 1955, the Setia Mulia Institution for Natural Sciences was established at Padang, Western Sumatra, under the auspices of the Institute. It comprises 150 acres of garden and 7,500 acres of forest reserve.

The aggregate area for the Bogor Garden and its several subsidiaries, therefore, consists of 885 acres of garden and 10,750 acres of forest reserve, a total probably not surpassed by that of any other botanical garden in the tropics.

Every botanical institute must have a library and a herbarium. At Bogor the library was started with 25 books in 1842. Such were the modest beginnings of what is now the renowned *Bibliotheca Bogoriensis* comprising 150,000 books and regularly receiving 1,400 periodicals. These books and periodicals relate to the pure and applied sciences, more particularly botany and ornamental horticulture. The library serves as a center for the forwarding of new acquisitions to 15 scientific institutions not forming part of the Institute. *Bibliotheca Bogoriensis* also takes care of the distribution of the Institute's publications. It is said to be the largest library of its kind in southeastern Asia.

The Herbarium Bogoriense dates from the establishment of the garden in 1817, but it did not get a home of its own until 1844 and was not properly housed until 1874. A herbarium is the sanctum of taxonomy, that is, identifying, naming, and classifying plants. For this purpose it needs material concerning the largest possible number of species. At Bogor half a million species are represented by dried material or material in alcohol. Needless to say this requires considerable space. It is therefore no wonder that Herbarium Bogoriense occupies four large buildings and a few

small ones. Approximately half of all the plant collections made in Indonesia have been deposited at Bogor. But since only a comparatively small part of the country has been botanically surveyed, the Institute sends out expeditions for the purpose of scientifically exploring parts of Indonesia and, if possible, bringing back living or prepared specimens of less-known kinds of plants. In 1956 six expeditions of this type were sent out.

In the early eighties the need was felt to make space available for foreign scientists coming to Bogor to conduct research. To meet this need a laboratory was established in 1884. It was transferred in 1914 to a new building, the Treub Laboratory, named after Professor M. Treub, a famous director of the Botanic Garden and founder of the old laboratory.

An ambitious project, the Flora Malesiana Foundation, was called into being in 1950 under the auspices of the Institute. Its purpose is the description of one of the richest of the world's floras, namely that of the Malesian area, starting with the Malay peninsula, embracing all Indonesia and the Philippines, and terminating at the eastern tip of New Guinea, an area larger (more than a million square miles) than that encompassed by any flora published up to now. With respect to the vascular plants alone a million plant specimens have to be examined. These have been collected in the course of the last four centuries and are now distributed in more than 50 herbaria located in all parts of the civilized world. At least 59 botanists of all countries are voluntarily contributing to this vast project, the direction of which is in the hands of Professor C. G. G. J. van Steenis, D. Sc., of Leyden. Here is a striking instance of international cooperation, in this case under Indonesian auspices. The work will be completed only after several decades.

Although originally intended to be a collection of plants, the Institute was later required to turn its attention to

Illustrations of the Bogor Botanic Garden

1. *Part of the Pandanus collection.*
2. *The President's Palace at the north end of the Garden, with the Traveller's Palm in left foreground.*
3. *Avenue of Canarium trees.*



Tree ferns in the Branch Botanic Garden at Tjibodas



Araucaria walk in the Branch Botanic Garden at Tjibodas

(Engravings prepared from photographs furnished by the Bogor Botanic Garden)

animals as well. In 1894 another division, the Zoological Museum, was opened at Bogor for the purpose of educating the public with respect to the fauna of their country. This division is also served by the expeditions just mentioned. The Museum consists of two sections, one accessible to the public, the other reserved for scientific research. There are large collections of skins of mammals, birds and other animals, besides an interesting insect collection embracing 3 million specimens and considered to be the largest of its kind in southeastern Asia. Large as this collection may be, it is estimated that it comprises only about a fifth part of the insect species occurring in Indonesia.

At the time these lines are written, plans are being examined for making the Bogor gardens the home of a collection of live animals, restricted to Indonesian species. If these plans materialize the animals will be housed in spacious enclosures constructed in a forested part of the Garden. As far as possible they will be given an environment similar to that occurring in nature. Moats rather than fences will be used as enclosures.

Another separate division of the Institute is the Laboratory for Marine Research established in 1906 for the study of oceanography and all sciences concerning the marine fauna and flora of the Indonesian archipelago. A public aquarium and museum are attached to this laboratory. It is situated at Pasar Ikan (Fish Bazaar), Djakarta, in another small subsidiary garden which is devoted to plants of the coast and lowlands. The Marine Research Laboratory operates a 200-ton seagoing steamer and a motor launch, the latter more especially used for the service of the Aquarium.

Under the Institute also comes Nature Protection. The first regulations on the subject date from 1909, but not until 1937 was the Lembaga Nature Protection established and integrated with the Institute. Its Director was simultaneously placed in charge of the administration of the Game Laws. There are at present in Indonesia 112 nature preserves (the oldest dating from 1910) with a total area of 5 million acres. The manage-

ment is in most cases entrusted to the Forest Service.

In order to train men and women for technical and practical work the Minister of Agriculture established the Academy of Biology in 1955 at the suggestion of the Director of the Institute. This Academy is situated at Tjiawi, 20 minutes by car from Bogor. It comprises extensive buildings including dormitories, guest rooms, lecture rooms, a dining room and a conference hall, on nearly 20 acres of ground. The intention is to expand the Academy of Biology into an Academy for the entire Department of Agriculture, so that in the future the professional training of staff for the Institute itself, the Government agricultural enterprises, the forestry service, the inland fisheries and other branches will be concentrated here. The teaching will not be at university level.

In 1956 the establishment of the Academy was followed by that of a Microbiological section, also at Tjiawi and at the time of writing still under construction on an area of about 25 acres. Thus a demand long felt will finally be met.

This terminates a partial description of an Institute modestly known as the *Kebun Raya Indonesia* ("Great Garden of Indonesia"), but in reality a body which, besides being of much value to the country itself, occupies an important place in international science. The Institute entertains relations and exchanges seeds, living plants, books, duplicate herbarium specimens, zoological material, research results, photographs and especially information of all kinds with botanical and horticultural institutions in all countries. It issues four serial publications, viz. *Reinwardtia* (systematic botany), *Annales Bogorienses* (physiology and biology), *Treubia* (zoology), and *Marine Research in Indonesia* (hydrobiology and oceanography).

If there is one place where plant scientists (and other biologists) may gain unusual tropical experience, it is in the Institute's Botanic Garden at Bogor.

For maintaining the good traditions of the past and for extending the activity of the Institute thanks are due to the vision, energy and perseverance of its director, Professor Kusnoto Setyodiwiryo.

When the Blues Take Over

HELEN M. FOX

The most dramatic time in my garden is when the blues take over. Peonies and iris will have bloomed and faded and there will have been an interlude when the hybrid roses have been at their height and a scattering of aquilegias and heucheras has been out in the borders. Then, one morning, seemingly all of a sudden, there will be masses and masses of *Delphinium grandiflorum* some of them up to three feet high but most of them short and having graceful sprays of flowers in the most brilliant startling blue. In the next few days more will come out, some with violet tints to their blue blossoms and a few in white. I grow them every year from seeds planted indoors in February, though some will live through the winter. They are set off by dark blue-violet, white or pale grey-blue flowering plants of *Campanula persicifolia*, a few taller plants of purple flowered *Campanula latifolia* and a scattering of white flowered *Malva alcea* which has pale pink pistils and stamens combined in its heart. As accents there will be scarlet and orange clumps of *Lilium pumilum* and *L. concolor* and as a low accompaniment drifts of light yellow *Allium Moly*.

I began to collect blue flowers in order to have companions for the orange and scarlet lilies. At first I shared the common belief there were only a few of them in comparison with flowers of other colors. Now I know there are a great many truly blue flowers and many more that are tinged with purple such as the violets, iris and campanulas and others with a grayish cast. To me, campanulas, even the white ones, look as if they had been dipped in a violet bluing. As for the violets, after having scanned authorities on the subject, I find only the following are said to be truly blue, namely *Viola mirabilis*, *triloba*, *hirta*, *montana*, *conspersa*, *canina* as also *elatior*, while there is often blue in *tricolor* (the pansies). The rest of them are mauve or

violet and, of course, yellow or white. I have not used the color chart in determining shades of blues, for I have found it is more descriptive to aim at a general effect. Besides many colors are named for these very flowers.

Blue is liked in flowers because it is the color of the sky, often reflected in lakes, the sea and brooks, also of distant hills. Having blue flowers in the garden brings heaven down to earth; something most of us try to accomplish in vain.

Because most blues are cool they harmonize with all colors, either those complimentary to them, such as yellow and orange or with violet and red. Among their virtues is that they are beloved by bees.

As everyone knows, who has tried to paint blue flowers, there is almost always an undertone of red, violet, or even of green. Moreover, in all flowers, the lines, dots or veins are generally darker than the rest, and where the petal bends or forms a hollow, there will be shadings in different degrees of intensity. Although it would seem there are myriads of different colors in flowers, the contrary is true. The same colors are repeated in many differently shaped flowers, belonging to entirely different families, as the pink budded blue flowers of borage and penstemon, and again the deep blue of aconites and certain hyssops and the green blue of Heavenly Blue morning glory that appears in some gentians and sages.

In a garden all colors are harmonized by the green of lawns and foliage or by motes of sunshine. Other colors are brighter on a rainy day. A garden composed entirely of flowers of one color could be handsome, but this requires more skill than most of us possess. Gardens planted predominantly with blue flowers would have to have white and yellow in with them, to prevent the effect from being too dark and cold. Most of us wish our gardens to be bright and

gay, and this is accomplished by mingling harmonious colors, and by varying the heights and habits of growth. Such a garden should contain annuals, perennials and some shrubs. At times and in certain places as in partial shade, the effect should be quiet, whereas in full sun it could be exciting and even startling. Individuals will differ in selecting colors for their gardens, and there is no rule that cannot be broken. In making a list of truly blue flowers, forget-me-nots, gentians, also many salvias and iris, are the first to come to mind. As I proceed, undoubtedly, it will be found many plants have been left out, while some that may appear to be too purple or too gray, have been included. As an excuse, it can be said that plants differ in depth of color, according to the amount of shade, acidity in the soil, climate, and other factors in their situations. The blue flowered plants are being presented to show how many there are to choose from in planting rocks, borders, and woodland.

EARLY SPRING BLOOM

Where I live in southern New York State, except for Christmas roses and *Hamamelis mollis*, there is little bloom out-of-doors until around March tenth, when year-after-year, the snowdrops come up no matter how deep the snow has been over them. Then, too, come species crocuses; unfortunately, practically all of them including the later blooming hybrids are not blue. However, indoors for me—and out-of-doors in many other localities—the blue flowered *Rosmarinus officinalis* as also *Teucrium fruticans*, a shrub with grey foliage and exquisite light blue or darker blue flowers, will have been out. Along the French Riviera, this teucrium is grown as a clipped hedge, and in February is colored very blue from its numerous blossoms.

By the time the first daffodils are out, muscari, or grape hyacinths will furnish handsome dark contrast to the yellow and white blossoms. The flowers of muscari form urn-shaped, torch-like spikes at top of stems, to twelve inches high. *Muscaris armeniacum* has the variety called Heavenly Blue, which is exactly that, and also a white form, while *M. comosum* var. *plumosum* where all the flowers are sterile, turns

fluffy and tufted. The dark blue flowered *M. armeniacum* quickly makes large clumps for me perhaps due to the fact I grow all my bulbs in the flower beds where the soil is cultivated, and where they do not have to struggle to find a footing, as they do when set out in lawns.

A few weeks later, comes *Chionodoxa* Glory of the Snow. Their few flowers atop a three to six inch high stem, face upwards and are unbelievably blue. *C. luciliae* has sky blue flowers. In variety *alba* they are white and in variety *rosea* they are pink. *C. luciliae* and *C. sardensis*, too, have intensely medium blue flowers. Coming at the same time is a little bulb with a long name, *Puschkinia scilloides* var. *libanotica* is said to grow one foot high, but is much lower in my garden and has graceful fringe-like spires of bluish white flowers marked with blue lines. It is fragrant too.

Through these early bulbs can be drifts of *Anemone apennina* in blue and other colors, and *A. blanda* with sky blue flowers. Both are eight to nine inches high, have deeply incised leaves and grow out of tubers that look like hard little brown nuts. They have been temperamental with me, but once established they seem to grow happily. As far as I can make out they seem to like a warm, sunny situation. In England I have seen them scattered over rocks and meadows through naturalized plantings of *Narcissus bulbocodium*, in a ravishing effect. Meanwhile, in the woods closely related *Hepatica americana* and *H. acutiloba* will be in bloom. The flowers are generally violet, pink, or white, but occasionally there will be a plant with slate blue flowers, and sometimes, too, there will be one with a most delicate fragrance. By mid-May, *Scilla hispanica*, Spanish bluebell, which can grow to twenty inches high, will be out. They do best in partial shade, and once established multiply rapidly. They are much like the famous blue bells of the English woods *S. nutans* and come in blue, white and pink, and are especially handsome in front of glistening foliage of large leaved evergreens, such as kalmia, azaleas, and *Ilex glabra*. I always plant small sized bulbs of *Hyacinthus orientalis*, and in a short time they make clusters instead of



GOTTSCHO-SCHLEISNER

Camassia esculenta

holding their club-like inflorescences up straight and alone. There are several good light blues among them.

A native bulb not planted as frequently as it might be is *Camassia esculenta*, the Quamash of Indians who ate the bulbs after processing them to rid them of their bitterness. The stems rise to twenty inches and bear their violet-blue flowers with spreading segments in terminal spikes. The buds, as

also the back of the flower, are bluer than the faces. Meanwhile, *Phlox subulata* will be spreading its growth of white, pink or blue over the rocks. There are a few blue color forms of this and of *P. nivalis*. Both, however, are tinted faintly with violet. It is safest to pick out plants of these from a nursery rather than to write for them. *Phlox divaricata* called blue phlox or Wild Sweet William, rises eighteen

inches or so and bears panicles of pale lavender blue or mauve clusters. It is charming with late narcissi and tulips, or covering the ground under pink flowered bushes of *Rhododendron vaseyi*, *nudiflorum*, or *roseum*. This phlox seems to like partial shade better than full sun and slightly acid soil.

In some shade, there will be mats of dainty blue flowers called bluets or Quaker ladies, *Houstonia caerulea*. The stems not over seven inches high, bear flowers having four lobes spreading from a tubular corolla. These flowers are either pale blue, lilac, or almost white and have a yellow eye. From a distance they look blue. They grow on the damp ground along the Bronx River in the parkway of that name. Last spring in a Connecticut garden, all through the grass and not over four inches high (probably due to the cutting of the grass, for it is generally taller), was *Collinsia verna*. It, too, has light blue flowers, only they are funnel-shaped and two lipped, the lower being bright blue.

LATE SPRING

Bushes of *Baptisia australis* with leathery leaves and long spikes of pea-like bloom in indigo blue, form a background to the iris I have planted on a bank, amid carnations and savories. Other iris are with pink, blue, and red peonies, as they have been planted for hundreds of years in gardens along the Hudson River by descendants of the first Dutch colonists. Over the years, I have bought and grown the hybrid tall bearded iris in shimmering blues such as Azure Skies, Blue Rhythm, Great Lakes, and Helen McGregor. It is unfortunate that nursery catalogues should list so few iris species, for they have a greater variety of form and habit of growth than these many tall bearded and are just as easy to grow. In order to select truly blue iris species, for most of them are violet, I leafed through W. R. Dykes' *Monograph on the Genus Iris*, in addition to consulting my own notes. Among species with considerable blue in them, are *Iris versicolor* and *prismatica*. From the West comes *tenax* and from the Old World, blue, as well as other color forms of *pumila*, while *persica* has light blue falls and violet standards, and must be a beauty.

By mid-May, the first of the linums

is in bloom. It is almost the bluest flower of all, and has given its name to flax blue. *Linum perenne* is a vase-shaped plant with wirey stems, clothed with small linear leaves and bearing five petalled flowers of medium blue which deepens towards the base of the petals on the inside. The flower stay open only until noon, however, and the ravishing blue effect of the morning will have disappeared by the time company arrives for lunch. The linums are handsome near a bush of *Rosa* \times *Harisoni*; clothed all its height in yellow bloom and having yellow primroses huddled in the shade beneath it. If the linums are cut back hard after blooming, they will grow back and flower later in summer. *Linum alpinum* is lower but equally blue, and so is *Linum usitatissimum*, an annual and the source of flax.

Charming and blue is the state flower of Colorado, *Aquilegia caerulea*. Thousands, probably millions of them, bloom in the mountains from May to late June and early July. Up there they exhale a sweet, delicate scent. Their stems rise to three feet and the flowers often two inches across have white petals and sky blue sepals. The long spurs nobbed at their tips stand out stiffly like insect feelers. The spurs of European and Japanese columbines are incurved and consequently the flowers are not as airy looking. There are white and pale pink forms of *caerulea*. I have not seen other colors but they have been noted and recorded. Unfortunately, *caerulea*, as happens so frequently with plants from high altitudes, does not persist lower down and will generally disappear after one summer's bloom. We sea level gardeners continue to try to grow them, however, and sometimes as with some of the penstemons we succeed. Mrs. Kathleen Marriage, who lived in Colorado Springs, had a woods of white limbed aspen trees on her ranch nearby, and under these had planted thousands of blue columbines selected over the years for depth of color. In with them grew *Calochortus nitidus* tinted lavender. This sight, once seen, is never to be forgotten. *Aquilegia alpina* a European plant is dwarfer, being only one foot high. It, too, is blue as is the species *caerulea*. In order to induce columbines to germinate well, it is a good plan to let the seeds be subjected to freezing



WALTER BEEBE WILDER

Asperula orientalis

either out-of-doors over the winter, or to spend three months indoors in a freezing compartment of a refrigerator.

Asperula orientalis is an annual with blue gray flowers which last a long time in bloom, and if cut back, will flower again. It seems to like a shady spot, and it often self sows.

The blue poppy, *Meconopsis betonicifolia* var. *baileyi* coming from the mountains of Tibet was introduced into gardens as recently as 1929. The poppies with their crinkly petals are truly a

heavenly blue. I've seen them growing riotously in Edinburgh's Royal Botanic Gardens. At home I've raised them from seed over and over again only to have them pine away. Either they cannot stand a low altitude, or great heat.

In May, amid the gray and deep red foliage plants in the herb garden, *Veronica spicata* and its varieties, several of them blue, display their dense racemes of flowers. Where it is dry and semi-shaded and very little grows, *Ajuga reptans* is extending its prostrate stems and raising its clublike inflorescences.

There are blue, purple and also white flowered forms and varieties with bronze and variegated foliage. *Vinca minor* likes some shade too, and has trailing stems, evergreen leaves and most frequently blue flowers. There are other color forms. *Polemonium caeruleum* also likes semi-shade and seems to do particularly well in acid soil. It is a dainty perennial related to phlox and having many common names, the best known of them being Jacob's ladder, undoubtedly bestowed upon it because of the pinnately divided leaves. The flowers grow sparsely, in racemes and their blue is tinged faintly with violet. When grown in a favorable situation, they will self-sow.

A family famous for its blue members is the BORAGINACEAE. Two annuals in this family come from the herb garden. They are *Borago officinalis* and *Nigella sativa*. Borage has drooping clusters of starry blue flowers and bristly, hairy, stems and leaves. The blue flowers and foliage have a flavor of cucumber. The leaves can be cooked (when they lose their hairiness) and provide a palatable green. *Nigella sativa* has oddly shaped flowers colored more green than blue, but *Nigella damascena* called love-in-a-mist has either white or pale blue flowers. It is dainty and grows to one and a half feet high, and has the virtue of seeding itself from one year to the next. The variety called Miss Jekyll is particularly handsome and has sky blue flowers. *Mertensia virginica* is almost the first perennial of spring. It is reputed to grow two feet high (never with me) and being native is hardy. It disappears entirely after blooming. The flowers arranged in a drooping panicle, have purple tubes from which flaring blue lobes spread out. Many handsome species are native to the Rocky Mountains where they sometimes grow beside stream banks.

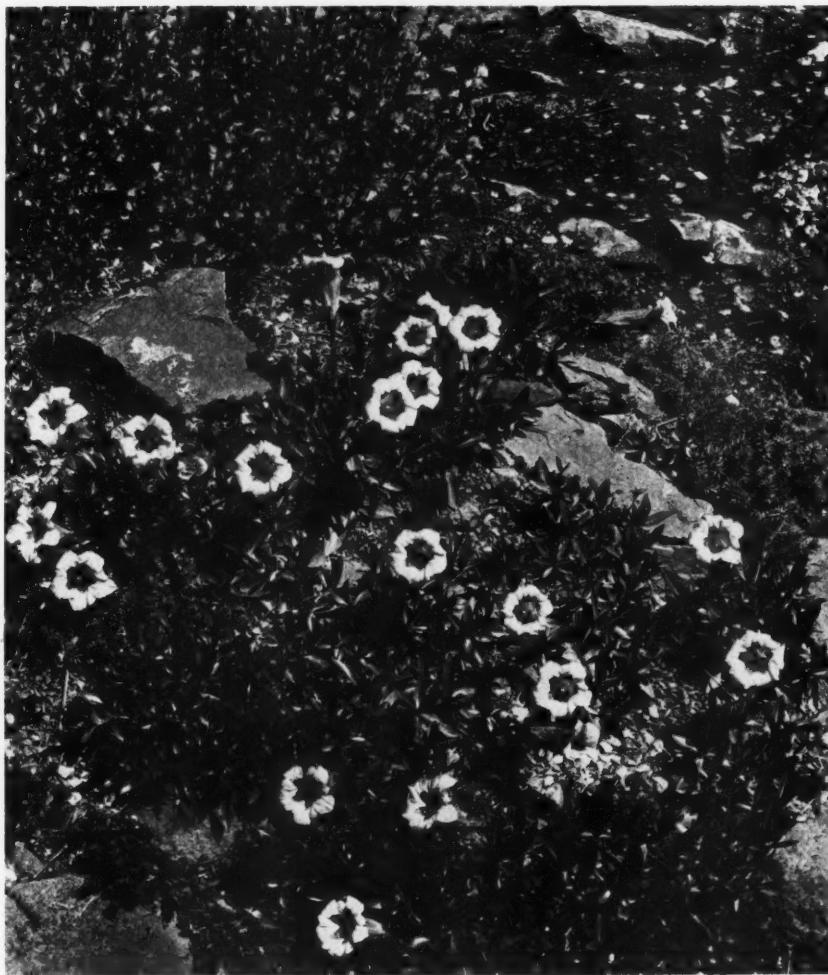
There are several horticultural forms of a borage called *Cynoglossum amabile*, a biennial to two feet high but will also flower first year from seed. Among them the two called Blue Bird and Firmament are handsome. They bring blue, terminal one-sided flowering clusters to the scene. Anchusas are similar. *Anchusa azurea* is perennial, grows to five feet high, and blooms later than the cynoglossums. *Brunnera macrophylla* was formerly

classed as an anchusa. It looks like a huge forget-me-not and blooms fairly early, but with me is evanescent. Most true forget-me-nots have pink buds that open into blue flowers, some of them are lighter, others slightly deeper blue. Perhaps, *Myosotis scorpioides* var. *semperflorens* which is dwarf and flowers most of the summer, is the most satisfactory. Some are annual, others perennial, and others biennial, and most of them self-sow. In fact, if they are planted in moist soil, they are likely to become almost too invasive. *Echium plantagineum*, Vipers-bugloss, is a handsome spiny weed and has blue flowers that vary in depth and are distinguished by touches of pink. Also of this family, is *Lithospermum diffusum*, (formerly *L. prostratum*) with brilliant blue flowers and a bushy habit of growth. There are other attractive blue flowered members of this genus.

SUMMER

The stately spires of blue, violet, white or mauve flowers, accented with white or dark bees of *Delphinium elatum* or *Delphinium cheilanthum*, and their many hybrids and varieties are almost the first flowers to come to mind when blue is mentioned. From my own garden experience, I have found they do best when planted either to themselves in rows in a cut flower or vegetable garden. When they are in the border, there should be plenty of space left around them for the air to circulate freely and prevent rot from developing. Moreover, in order to have good crops of healthy plants, they are best grown as biennials. Ideally they ought to raise their tall flower heads from a low growth of dwarf lavenders, yellow Iceland poppies, hypericums, or many of the medium height campanulas, and be neighbors to clumps of glistening white *candidum* lilies. Delphiniums seem to require alkaline soil and one that is fairly rich in humus. When a particularly fine color form appears, growers increase them by making root cuttings. No trouble is too much to succeed with these superlative plants.

The annual larkspur is either *Delphinium ajacis* or *Delphinium consolida*. They come in many shades of blue and also in violet, pink or white, and with both single and double flowers. The stems may be spire-like or branched. They should be planted either in the



GOTTSCHO-SCHLEISNER

Gentiana acaulis

autumn or some time in March. Where I live, there are always a few warm days in March when the dormant spraying of fruit trees and lilacs is done, and when we get our larkspur and sweet pea seed into the ground before it freezes hard again.

Meanwhile, over in the rocks, the penstemons will have bloomed. Fortunately, the western species succeed with me, perhaps because I happen to have

the right place for them, namely, on an exceedingly well drained slope and facing south. Among the blue-flowered penstemons hardy for me, have been *P. ovatus* having dentate leaves. The clusters of forget-me-not blue flowers darker on the outside of the trumpets are borne on stems eighteen inches high. *Penstemon cyananthus* has striking blue flowers in sprays about six inches long. The flowering stems grow to sixteen inches high.

Penstemon angustifolius blooms in May. Its flowers open blue are shaded violet and turn pink as they age. Later on comes *P. unilateralis* blue-tinged rose with its flowers all on one side of the stem, and several others, many of them blue and shrubby.

In midsummer, among the herbs, are many plants of shrubby, fragrant-leaved *Hyssopus officinalis*. Some of these have flowers in a strong blue, others come in violet, white or pink. *Cichorium intybus* because of its untidy habit of growth and the fact that the flowers close early in the day, is placed in an inconspicuous place at the back. However, its flowers are of a lovely sky blue, here, in the southern part of New York. But, further North around Lake Champlain, they are much deeper. *Nepeta macrantha* and *Nepeta* André Chaudron are bushy, blue flowered plants. When *N. macrantha* is cut back, it blooms again later in the summer.

There are many handsome sages which begin to bloom in July and keep on into September and even October. Several of them are not hardy with me but are carried over the winter indoors because of their good looks. A half hardy perennial is *Salvia patens*. The flowers shaped like parrots' beaks, as are all salvias, are of a truly amazing deep blue. *Salvia farinacea*, called Mealycup, has wirey erect two feet high stems and flowers blue tinted violet. There is also a white form. *S. azurea* is winter hardy, and its wirey stems two or three feet high need staking. The stems carry spires of loosely arranged pale blue flowers about their upper portion and while they are in bloom, though there are only six plants scattered through the border, each has so many stems and they are so effective, they dominate the scene. *Salvia uliginosa* is not winter hardy for me, yet it is stunning. The stems are three feet high, the leaves long and slender and the flowers of an intense medium blue, seeming to have chartreuse green in it.

Late in the summer, in the rocks, in semi-shade, and somewhat acid soil, and facing west, the gentians will be bloom-

ing. I do believe the first time I saw these growing wild in Switzerland was one of the most thrilling moments of my garden experience. I bought the plants I have now, and am not sure they are correctly named, and undoubtedly some of them are hybrids. Among them, *Gentiana septemfida* bloomed July 13 and has flowers of a brilliant green-blue, and *G. hascombensis* came ten days later, with flowers of a Cobalt Blue.

In the woods where I live, *Gentiana andrewsii*, Closed Gentian, with flowers of a very deep purplish blue, can be found wild, and with them will be *Lobelia cardinalis* and its close relative *Lobelia siphilitica*, which has bright blue blossoms and makes considerable clumps. Because of its blue flowers *Lobelia siphilitica* deserves a place in the garden in spite of its coarse, sprawly leaves. In my other home, one September, in a moist field facing south and amid blueberry bushes, hundreds of Fringed Gentians, *Gentiana crinita*, suddenly appeared. The plants grow two feet or more high, their bright blue solitary flowers with fringed petals standing very straight. They cannot be transplanted. The seed loses its viability quickly and should be sown as soon as it ripens. I have never succeeded with them. They ought to do well in a situation similar to one where they grow wild, namely, where the soil is acid and damp.

LATE BLOOM

In the last picture in the garden, aconites play a star role. *Aconitum napellus* has very dark blue flowers and blooms in mid-Summer, while *A. napellus* var. *bicolor* comes late in September among the last roses and hostas. Along with it come Japanese anemones and clumps of *Ceratostigma plumbaginoides*, a low-spreading plant which likes sunshine. Its flowers have red calyxes and bright blue petals. Close to it botanically is the pale blue flowered *Plumbago capensis*, a sub-shrub not hardy for me, but handsome in pots. In late summer, too, there will be blue asters and silvery-headed echinops.

BLUE FLOWERS FOR THE GARDEN

Annuals

Asperula orientalis
Borago officinalis
Brachycome iberidifolia
Browallia elata
Callistephus chinensis
Delphinium ajacis
Delphinium consolida
Lobelia erinus
Nemesia foetens
Nemesia versicolor
Nemophila menziesii
Nigella damascena Miss Jekyll
Phacelia whitlavia Blue Bell

Perennials

Aconitum fischeri
Aconitum napellus
Aconitum napellus var. *bicolor*
Aconitum paniculatum
Ajuga reptans
Amsonia tabernaemontana var. *salicifolia*
Anemone apennina
Anemone blanda
Anemone pulsatilla
Aquilegia alpina
Aquilegia caerulea
Aster azureus and many more
Baptisia australis
Camassia esculenta
Ceratostigma plumbaginoides
Chionodoxa luciliae
Chionodoxa sardensis
Cichorium intybus
Collinsia verna
Cynoglossum amabile
Delphinium cheilanthum
Delphinium elatum
Delphinium grandiflorum
Echinops exaltatus
Echium plantagineum
Eryngium amethystinum
Gentiana acaulis
Gentiana andrewsii
Gentiana crinita

Gentiana hascomensis
Gentiana macauleyi and many more
Hepatica acutiloba
Hepatica americana
Houstonia caerulea
Hyacinthus orientalis (blue ones)
Hyssopus officinalis, blue
Iris, Tall Bearded, Azure Skies, Blue
 Rhythm, Great Lakes, Helen McGregor
Iris persica
Iris prismatica
Iris pumila, blue form
Iris versicolor
Linum alpinum
Linum perenne
Linum usitatissimum
Lithospermum diffusum
Lupinus bicolor
Lupinus parviflorus and many more
Lupinus perennis
Meconopsis betonicifolia var. *baileyi*
Muscari armeniacum
Muscaris comosum var. *plumosum*
Myosotis scorpioides and many more
Nepeta André Chaudron
Nepeta macrantha
Penstemon angustifolius
Penstemon cyananthus
Penstemon ovatus and many more
Phlox divaricata
Phlox subulata, blue forms
Plumbago capensis
Polemonium caeruleum
Pulmonaria angustifolia
Rosmarinus officinalis
Salvia farinacea
Salvia patens
Salvia uliginosa
Teucrium fruticans
Tradescantia virginiana
Veronica spicata and others
Vinca minor
Viola canina
Viola hirta
Viola mirabilis
Viola montana
Viola triloba



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The Saffron Crocus from The Grete Herball, 1526

Saffron Crocus

E. BUCKNER KIRK

Spring comes to our gardens with the crocus—purple and white and gold. It appears as if by magic from the winter earth in the first warmth of spring sunshine. Too few people realize that the spring crocus has a cousin which blooms in the fall, a gay small flower which has a history, a story that takes us back into a remote past where dates are uncertain and records scant. But still it can be traced, for the crocus is a part, however tiny, of the story of civilization.

Usually, in telling the story of a flower and how man has used it, it is possible to do so only by considering the genus as

a whole. But in the case of the crocus we are concerned with only one of the seventy-odd species that make up the genus—with the purple or lavender autumn crocus from which saffron is made. *Not colchicum*, the meadow saffron sometimes called autumn crocus, but *C. sativus*, a species of true crocus that is close kin to our small heralds of spring. Undoubtedly saffron has occasionally been made from other species and varieties, but it was the autumn crocus that was cultivated for practical purposes long before flowers were appreciated for their beauty alone.

Saffron has played a part in man's religion and has served him as a medicine, a dyestuff, a flavor and a perfume. It is known factually so far in the past that one is tempted to venture even further back in time and picture that vivid yellow dyeing priestly hands before it dyed priestly garments; when its pleasantly astringent perfume was an offering to the gods before man's widening mental horizon allowed him to dare to use it for himself. But, speculation aside, we can place saffron almost as far back as we can find evidences of civilization.

More than four thousand years ago human hands fashioned a spouted pottery jug, decorated it with pairs of red and white crocus, fired it and turned it over to a Bronze Age housewife to use for water, wine or oil. This jug was found in Crete, where Sir Arthur Evans, while exploring the culture of the Minoans, found the first evidence of many of our common flowers. On a wall in the palace of the Kings of Minos there is a fresco in which we find our crocus again. *The Blue Boy Picking Crocus* was painted at a slightly later date than the jug was made. His is a strange, elongated figure, clad only in a loincloth and painted a blue-gray. Stretched at an awkward diagonal across a rocky field, he is gathering crocus and putting them into bowls scattered among the rocks. The artist was so anxious that there be no doubt whatever about the flowers that he exaggerated the swelling curves of the petals and turned the conspicuous stigma and stamens into something very like a fringe. As the crocus was one of the Minoans' sacred flowers, Sir Arthur thinks this picture may have had a religious significance.

Later still we find the crocus definitely associated with Minoan religion when it appears on the votive robes dedicated to the great Minoan goddess, Britomartis.

No woman, unless dead to all feminine instincts, can be indifferent to the clothes worn by the Bronze Age ladies of Crete. Pocahontas in her very best buckskins would never seem elegant to us, nor would the best-dressed modern Eskimo. But Minoan women of thirty-five hundred years ago had chic. Their skirts were full and wide below tight-waisted bodices, with elbow-length sleeves, which were cut low to expose the entire breasts. With the exception of that slightly star-

tling difference, these dresses would be smart today. They have indefinable something we call "style."

It is such a frivolous something, so sophisticated and so worldly that it is almost shocking to find their revered goddess flaunting these sprightly garments. Yet there she is for all to see, a debonair little figure modeled in faience. On faience votive robes cut to the same pattern and hung in her temples we find the sacred crocus—sometimes on a flat panel down the front of a dress, sometimes decorating the edges of the large ruffles that form a skirt.

It is very probable that this goddess presided over the production of saffron, a flourishing industry on which a goodly part of the wealth of the Kings of Minos must have been based. Since Crete was an island with an overseas trade—a sort of early Mediterranean version of Great Britain—it is interesting, though somewhat fantastic, to speculate about the problems involved.

"Processing" and "distribution" are words so steeped in associations with twentieth-century mass production that it is hard to think of them as applied to a prehistoric business. Yet the stigma of the crocus must be gathered by hand, dried and pressed to make saffron. That is surely "processing." "Distribution" we know nothing about but we do know that Crete carried on trade around the entire Mediterranean. Saffron would have been a luxury item in that trade, restricted to royalty or the very rich. It takes over four thousand flowers to produce an ounce of saffron and the price has always been correspondingly high. A pound of saffron today costs \$152.

The mystery of the Minoan writing has only recently been unraveled. Once the long slow job of deciphering all the texts is completed we shall know more about saffron and its importance to Crete. For even before the texts could be read one could see in them, repeated again and again, a symbol that is unmistakably the crocus.

In Egypt there are no crocuses to be seen on pottery or on frescoed wall, but we can read about them, because in the Papyrus Ebers the herb *snwtt* has been identified, on much sounder grounds than is usual in ancient descriptions, as the saffron crocus. On the strength of

that identification, we have a good excuse for taking a look at this remarkable medical work, one of the oldest complete books in the world.

In the winter of 1872 Georg Ebers, a German Egyptologist, was excavating near Thebes when he was approached by a native who had something to sell. Packed in a metal case, wrapped in old mummy cloths, was an object that must have taken Ebers' breath away. It was a rolled manuscript, in perfect condition, its ink—black for the text, red for the rubrics—as sharp and bright as when a scribe had used it nearly thirty-five hundred years before. The document was sixty-eight feet long, twelve inches wide.

Ebers could not afford the price demanded by the Egyptian, but a compatriot, a Herr Gunther, came to the rescue and bought the manuscript, which was eventually given to the University of Leipzig.

The Papyrus Ebers was written out at about the same time that the glazed clay figures of the Minoan goddess were made, around 1550 B.C., but modern scholars believe that it is a copy of a much older medical work, and that possibly the original from which the Papyrus Ebers derives was compiled as long ago as 2650 B.C., about the time Cheops built his pyramid at Giza. If this is true, the use of saffron in Egypt would predate anything we know about it in Crete.

Along with saffron, which is supposed to have been imported into the country, and such native plants as dates, raisins, papyrus and lotus, the Papyrus Ebers contains as strange an assortment of drugs as one would encounter in all the strange medicine of antiquity. The toes-of-a-dog, human brain, scribe's excrement, worms' blood, and an-old-book-boiled-in-oil are among the components used in prescriptions for all manner of ills.

When taking some of these gruesome remedies, it was doubtless comforting to the patient to preface his dose with a prayer, one of which reads: "Oh Isis, thou great magician, heal me and save me from all wicked, frightful and red things, from demoniac and deadly diseases and illnesses of every kind. Oh Ra. Oh Isis."

Saffron was one of the drugs used to "remove rheumatism in the sacral re-

gion." If rubbed on there, the pain was supposed to disappear immediately. Eating crocus seed on bread would have the same effect. Saffron was also good for paralysis—though only on the right side of the body. Crocus-from-the-hills and crocus-from-the-delta, along with various other herbs, made a medicine "to force out urine." In sweet beer, it "strengthened the teeth." It was used in a plaster for gumboils and again with other herbs in a poultice to apply to the abdomen when there was an obstruction.

Grotesque as all this sounds, it has been pointed out that the priests, who were also the physicians of Egypt, were not mere "magicians contending with a demon-infested world." They were, naturally, men of their time, so both prayers and spells appear in the Papyrus Ebers. But it is clear that these early doctors also reasoned about their treatments. Medicine was administered orally for internal troubles; pain was generally treated with poultices; ointment was used for skin diseases; and for eye infections, then as now a major problem in Egypt, medicine was dropped into the eye.

We have traced the crocus into such far reaches of antiquity that before we come to it in classical times it will seem that we are stepping onto familiar ground when we enter the garden presumably laid out by Solomon in the tenth century before Christ:

"Until the day break, and the shadows flee away, I will get me to the mountain of myrrh, and to the hill of frankincense. . . . Thy plants are an orchard of pomegranates, with pleasant fruits; camphire, with spikenard, spikenard and saffron; calamus and cinnamon with all the trees of frankincense; myrrh and aloes with all the chief spices."

In Greece dawn "spread her saffron robe" over the world as early as the time of Homer. One Greek myth tells us that the crocus sprang from the ground where Zeus had lain with Hera. Another says that it was named after a baby tragically killed, while a third gives it the name of a youth who died for love of the shepherdess Smilax.

The garments of gods and goddesses, nymphs and nereids, were often described as saffron-hued, so the crocus as a dyestuff probably reached Greece very

early, quite possibly from Crete. Its fame as an aromatic perfume may have come from the Orient. Theophrastus lists it among the plants so used, but by and large it is most often referred to in Greek literature as a color.

The Romans followed the Greeks in their enthusiasm for the color and perfume of saffron, but in the decadent days of Rome the heritage of moderation derived from the temperate Greeks went by the board, with saffron as with everything else. Theaters and banquet halls were drenched with a scent most of us would find distinctive and not exactly unpleasant, but certainly not worth the fabulous cost. Between courses of a banquet given in Nero's time slaves sprinkled the floor with sawdust mixed with saffron, vermillion and powdered mica—perfume, color and glitter all in one packet.

At the same banquet, described in *The Satyricon of Petronius Arbiter*, cakes were served in the form of apples and other fruits. "We applied ourselves wholeheartedly to this dessert and our joviality was suddenly revived by a fresh diversion, for at the slightest pressure all the cakes and fruits would squirt a saffron sauce upon us, and even spurted unpleasantly in our faces."

The story of the crocus in antiquity would necessarily include its use in cookery, as a perfume, as a dye and in medicine, but the most interesting aspect would be to trace it as a commercial commodity catering to these uses. There is little doubt that it was one of the most lucrative and romantic commercial activities in the early history of man.

All through the Middle Ages and down to about a hundred fifty years ago saffron continued to be a profitable article of commerce—so valuable that a few pounds of crocus bulbs could be offered as security for a loan in lieu of gold or jewels; so important that in fifteenth-century Nuremberg three men were buried alive for adulterating it.

There is evidence that the saffron crocus may be the one flower that owed its arrival in England to the Crusades though it was a pilgrim rather than a Crusader who brought it home. The story originated with Richard Hakluyt, a sixteenth-century geographer whose enthusiasm for the history of discovery has preserved valuable narratives for us,

some not entirely free of tall tales. If this story about the crocus is a tall tale it is still worth the telling if only to emphasize the value put upon saffron at the time.

"At Algiers a pilgrim stole beads [corms] of saffron and hid them in his Palmer's staff which he had made hollow before of purpose, and so he brought this root to this realm, with venture of his life; for if he had been taken, by law of the country from whence it came, he had died for the fact"

From other sources the coming of the crocus to England is usually placed in the reign of Edward III, 1327-1377. In any case it began to be cultivated there early in the fourteenth century. As it takes over sixty thousand flowers to make a pound of saffron, it is clear that, once a cultivator of the precious stuff had obtained his bulbs, his principal expense was labor. That, in those benighted days, was no large item in any farmer's or businessman's budget. Once the ground was cleared, cultivation was fairly simple. With a tool known delightfully in middle English as a "dybyl":

Three ynches depe they most sette be
And thus seyde mayster Ion Gardener
to me.

Profits were high but the small amount of saffron yielded by thousands of flowers kept the supply from exceeding the demand. Perhaps, too, saffron was not such a sure-fire crop as it might have seemed. There is an old English folk saying that sums up bad luck: "You set saffron and there comes up wolfsbane."

In spite of that discouraging adage farmers considered saffron a good investment. In 1557 Thomas Tusser included it in his *Hundredth Good Pointes of Husbandrie*, a most engaging agricultural treatise all in rhyme.

Pare saffron plot
Forget him not;
His dwelling made trim
look shortly for him.
When harvest is gone
then saffron comes on;
A little of ground
brings saffron a pound.

About a century later saffron still had importance as a profitable crop. Robert Turner, an herbalist of the time of

James II, was a royalist whose loyalty to the House of Stuart made him only too happy to catch the Calvinist Roundheads in an inconsistency. Strict observance of Sunday was one of the tenets of their faith, so Turner pointed out gleefully that the saffron crop "must be gathered as soon at it is blown, or else it is lost; so that Jack Presbyter for covetousness of the profit can reach his Sabbatarian conscience to gather it on Sunday."

Individual farmers throughout England obviously found saffron worth cultivating but the major production centered around Saffron-Walden, a town in Essex which took its name from its chief product. Writing about the middle of the seventeenth century, John Evelyn tells of paying a visit to Audley End, one of the great houses of England, "in Saffron-Walden parish, famous for that useful plant with which all the country is covered." Saffron growers were often called "croakers."

For more than four hundred years saffron continued to be cultivated in England as an important commodity. It was an ingredient in innumerable medical prescriptions; it was indispensable to a kitchen of any pretensions whatever; it was an important dyestuff; and it had a number of minor uses as a perfume and aromatic, besides being used as a substitute for gold leaf on illuminated manuscripts.

By 1800 all but its medical uses had declined to a point where saffron no longer had industrial importance. Yet what a story it is! Unless all the indications in Crete deceive us, here is a luxury item that has been in production for at least three and a half millennia.

Saffron as a drug is still in our official pharmacopoeia. Made into a tea it is sometimes used in the treatment of measles. Its property of provoking perspiration tends to bring out the rash and combat the fever. As modern chemistry turns out more "miracle drugs," the life expectancy of the crocus as a medicine is probably short, but no other flower has a longer documented record.

It is a vastly confused, contradictory and often absurd record. Actually, as one reads herbals and medical books from the first to the nineteenth century one has a despairing impression that saf-

ron went into *all* the medicines described.

Saffron did figure in a preposterous number of medicines, especially those designed to raise the spirits of men. Perhaps the cheerful color of saffron connected it with gaiety even in its medical history. Several herbalists mention that it moved men to laughter and Francis Bacon remarked that "it maketh the English sprightly." Be that as it may, in classical times saffron had been noted medically as having a relationship to women and wine, though not concerned with song. Dioscorides said that "it stirrs up also to venere."

According to Pliny, saffron in wine will relieve or cure the more unpleasant results of overindulgence in alcohol, but "chaplets, too, made of saffron and worn on the head, tend to dispell the fumes of wine." It is venturing on specialists' ground to suggest it, but the chaplet is a circle, and the circle connotes remote and primitive magic. It is just possible that Pliny's remedy for drunkenness stems from a far past, when man first began to struggle with a problem which is still with us.

Echoes of the use of saffron for coping with alcoholism are to be found in various herbals up to the Renaissance, when the great sixteenth-century botanist William Turner dismissed the matter with the biting remark that saffron was "good for weak braynes that cannot well beare drinke." William, one somehow feels sure, had a good hard head and carried his liquor, if not with grace, at least with dignity.

The medical history of saffron is far too complicated for any layman to unravel. But if we turn to the domestic medicine of the stillroom books we can get a good idea of the ways it was used—for obstructions, "meazels," plague, "Vapours of the Spleen and fits of ye Mother," consumption, as a wound salve, and especially in cordials for jaundice.

The use of saffron for treating jaundice is of course obvious. Long before the sixteenth-century Swiss physician Paracelsus publicized the Doctrine of Signatures, the theory was being put into practice. The Doctrine of Signatures held that a resemblance between the external characters of a disease and some physical agent (as that between the red skin of scarlet fever and a piece of red

flannel) was supposed to indicate the agent in the treatment of the disease.

The association of ideas in saffron—yellow—jaundice is obvious, but earthworms do puzzle us. It is not clear how they, along with saffron, came to be used for jaundice, but Elizabeth Grey, the seventeenth-century Countess of Kent, begins a prescription for jaundice quite simply with "Take earth Wormes . . ." Later prescriptions tend to be more explicit. Nine earthworms split and cleaned, with a handful of "Sallendine" and a pennyworth of saffron in ale was "Mrs. Skillins Rect. for the Yellow Jaundice," according to a receipt in *A Book of Simples*. Another, very long and complicated, adds a peck of snails to a quart of earthworms and a whole ounce of saffron, along with quantities of herbs.

Finally, there is a straightforward receipt within the reach of all but the very poor, which probably saw frequent use:

"Take a handful of earth wormes and put them awhile in salt and water to cleanse themselves then put them into a quart of white wine and steep well until they dissolve then strain them out then put to the strained liquor four penny worth of english saffron and let that steep well in it also and let the party grieved take of this liquor thus prepered a quarter of a pint first in the morning and at four a clock in the afternoon and last at night. Probatum est."

The cordials of the herbals and still-room books were designed to combat melancholy and to lift the spirits of suffering men. In this negative form the classical idea of saffron as conducive to gaiety may have finally taken shape. Even though saffron was used constantly for both melancholy and jaundice, no clear thread for its usage can be traced in its medical history. But that history, confused as it is, is impressively long.

Saffron is far from unknown in our American kitchens today. Two world wars that have revolutionized our whole economy have almost exterminated the genus *cook*. The band of amateurs who have, willy-nilly, taken over diversify the drudgery of daily meals by exploring the cuisines of foreign countries in search of interesting and nourishing foods. From Spain and Portugal come many a dish colored and flavored with saffron. In fact chicken

and rice so flavored and colored has almost ceased to be exotic. Bouillabaisse from Marseilles is another saffron-flavored dish that is far from unfamiliar.

In contrast to our tentative experiments, saffron was ubiquitous in English and European kitchens throughout the Middle Ages. *The Forme of Cury*, 1390, was the first cookbook in the English language and was compiled by some of the two thousand cooks in the kitchen of Richard II. Its appearance probably inspired other eager souls belonging to that vast fraternity which is perennially interested in the welfare of the inner man. So a number of other collections of receipts were forthwith written down and a few have survived, among them one listed in the British Museum catalogue as "Harl. 279." It is from this that the following receipts were taken:

COKYNTRYCE

Take a Capoun, and skald hym, and draw hem clene, and smite hem in the waste across; take a Pigge, and skald hym and draw hym in the same maner, and smyte hem also in the waste; take a nedyl and a thred, and sewe the fore party of the Capoun to the After parti of the Pygge; and the fore partie of the Pigge to the hynder party of the Capoun, & than stuffe hem as thou stuffest a Pigge; putte hem on a spete, and Roste hym; and whan he is y-now [enough], gild hem with yolkes of Eyroun, and pouder Gyngere and Safroun, thenne wyth the Jus of Percely withowte; and than serve it forth for a ryal [royal] mete.

SMAL COFYNNS

Take fayre Floure, Safroun, Sugre & Salt, & make ther-of a past; than make smal cofyns; then take yolkys of Eyron, & separate hem fro the whyte & lat the yolkes be al hole, & not to-broke, & lay iii or iv in a cofyn; and than take marow of boyne, ii or iii gobettys, & cowche in the cofynn; than take pouder Gyngere, Sugre, Pasony, & caste a-bove; & than cover the cofyn with the same past, & bake hem, & frye hem in fayre grece, & serve forth.

It is difficult to keep within bounds when it comes to quoting old receipts. Surely almost anyone would like to

know how "To Make A Fayre Garbage" (chicken giblets, feet, etc., with many seasonings) or how to handle "Smal Byrdys Y-Stwyde" or "Oystyrys in Gravy Bastarde." But we cannot linger indefinitely over such appetizing delights. The point about saffron in cooking is that from being used in practically all dishes it gradually disappeared from English kitchens entirely and from most Western cooking except the Hispanic. Now in our own time it may make a comeback but it is too early to say just how popular it will prove so far as taste is concerned. But certainly it is one of the most delightful coloring substances in all cookery.

A number of our familiar flowers have served as religious symbols in some of

the earliest civilizations we know. Still more have histories as medicine reaching back over several thousand years. The crocus belongs to both groups. That should be, heaven knows, distinction enough for any flower but the crocus is unique in its relationship to man. Besides its religious and medical aspects we find clear indications that it had been used as a dye and a perfume for so long a time that Bronze Age Crete had a flourishing industry based on the production of saffron. A pleasant smell and a pretty color must have been among the earliest amenities that mankind knew. Such amenities played their part in leading man out of savagery into civilization. The role the crocus played in that great drama must have been a tiny one, but who can deny that the flower was on the stage?

The "Saffron Crocus" chapter from *Flower Chronicles* by Buckner Hollingsworth, just released by Rutgers University Press, New Brunswick, New Jersey, 302 pages, illustrated, \$5.00. (Reprinted by permission of the author and the publisher).

See review in the next issue of this magazine.

Members of the Society may remember E. Buckner Kirk (Mrs. Buckner Hollingsworth) contributed interesting papers to *The National Horticultural Magazine* on the Nasturtium (Oct. 1952), Iris (April 1953), Peony (April 1954), and Lily (April 1955). These articles, plus "histories" of 12 other plants, are united in a most enjoyable volume.—*Ed.*

A Portfolio of Snowdrop Portraits

The portfolio of photographs by Edwin C. Peckham shows specimens from the collection of rare snowdrops in the garden of Brigadier and Mrs. L. W. H. Mathias at Hyde, Chalford, Gloucestershire, England.

The property formerly was owned by the late well-known gardener and collector, Mr. Walter Butt. In the arboretum, which was his absorbing interest, he grew many rare snowdrops. When some years after he sold the property, it passed into the ownership of Brigadier Mathias, groups of these bulbs had survived the neglect of the war years. It was obvious that these magnificent specimens should be looked after and propagated. During the many years of careful replanting and observation the collection was greatly enlarged, and other interesting snowdrops added. Since 1952 many of the various snowdrops at Hyde have been distributed by Brigadier Mathias as proprietor of the Giant Snowdrop Company.

Of some 37 different snowdrops grown at Hyde, *Galanthus nivalis* S. Arnott, is the most outstanding. With its superb flowers, sweet scent, and graceful growth, it is unequalled in woodland drifts, borders, and rock gardens. The cut blooms, averaging ten to fourteen inches in height, are excellent for house decoration. An attractive contrast is *Galanthus platyphyllus* with elegant flowers, and

notable for its bright shining green leaves which enrich the bleakness of the garden in early spring. These two varieties are quick to increase, and take kindly to many soils and climates. *Galanthus elwesi*, another large snowdrop, is more temperamental, but if happily placed, will flourish and become prolific.

Many others are strong growers. Among them are *Galanthus* \times Colesbourne, shorter, with huge flowers, dark green trumpets; *Galanthus* \times Magnet, a garden form with bell-like heads drooping and swaying on long pedicels; *Galanthus ikariae*, a late-comer in the season, with dark wide curled leaves and heavy marking; *Galanthus byzantinus*; *Galanthus plicatus* and its W. V. Mathias forms; *Galanthus nivalis* var. *viridapicis*; and *Galanthus nivalis* forma *scharlocki*, spotted with green on the outer segments and with divided horn-like spathes; and the well-known large and shapely *Galanthus nivalis* Atkinsi. All these are worth growing for their beauty and variety.

Finally, the "collectors' pieces" although not yet to be found in catalogs, may still be come by occasionally to complete a fascinating study.

—Mrs. L.W.H.M.

These snowdrops are described in detail in the volume entitled *Snowdrops and Snowflakes*, by F. C. Stern, reviewed in the October 1957 issue of *The National Horticultural Magazine*.—Ed.

(Engravings made from photographs taken by Edwin C. Peckham)

(Legend notes by F.P.L.)



Galanthus nivalis S. Arnott

A garden form of the common snowdrop. Pure white with deep green crescent on outside of inner segments and green lines on inside, tall 10-12 inches, flowers one inch long. Strong fragrance. Received the Award of Merit from the Royal Horticultural Society in 1951.



Galanthus nivalis Atkinsi

One of the earliest improved forms of the common snowdrop, discovered in the 1860's. All species and varieties of galanthus are white with outer segments sometimes tinged green and inner segments marked green, or rarely yellow, on their outer surface.



Galanthus × Magnet

The long, slender pedicel carrying the flower at a pleasing curve, is distinctive. Another good hybrid is Colesbourne, a large white with green inner segments of the flower frilled white; 7 to 9 inches tall.



Galanthus × *Straffan*

A hybrid of *Galanthus plicatus*, or perhaps a form of it, originating in Eire. Long flowering for second flowers take the place of those first blooming.



Galanthus × Ketton

Like the four preceding illustrated forms, a garden hybrid or form. Triangular, narrow green markings on the inner segments.



Galanthus nivalis forma *scharlocki*

A form of the common snowdrop found in the Nahe valley in Germany. Usually, the spathe from which the flower pedicel extends, is divided; slight green markings on the outside of the outer segments of the flower.



Galanthus nivalis var. *lutescens*

A rare variety of the common snowdrop with yellow markings on the inner segments of the flower.



Galanthus nivalis var. *viridapicis*

Another variety or form of the common snowdrop with green markings on the outer segments of the flowers.



Galanthus nivalis var. *pockiformis*

A variety of the common snowdrop with inner segments almost as large as the outer segments of the flower and almost or entirely white.



Galanthus graecus

A species from the Balkans and the Aegean Islands. Has twisted leaves. The common snowdrop (*Galanthus nivalis*) has a much wider range from France and Spain to Southern Russia.



Galanthus plicatus

A species from Southern Russia and Roumania. Large flowers for a species; reduplicate edges to leaves.



Galanthus plicatus, a double form

There are several garden strains of double snowdrops usually with a compact rosette of twenty to thirty inner segments. The above illustrated form is a double form of a species found in an Irish garden.



Galanthus byzantinus

This species, similar to *Galanthus graecus*, is native to Turkey and Asia Minor. It also has deep green markings at the base of the inner segments of the flower but the leaves are reduplicate or recurved at the edges, not twisted.



Galanthus ikariae

A species from the Island of Nikaria, Greece, Asia Minor, and Turkey. There is variation in width of the outer segments of the flower, also in time of flowering. The above species is an early blooming form.



Galanthus ikariae

This form of the species is a little later in blooming than the previously illustrated one. Most snowdrops bloom in February and March unharmed by snow. There are two rare snowdrops that bloom in the fall: *Galanthus nivalis* subsp. *reginae-olgae* and *corcyrensis*.



Galanthus elwesi

A species snowdrop from Asia Minor, Turkey, and the Aegean Islands.
Distinguished by its glaucous, broad, erect leaves.



Galanthus alleni

Not known in the wild and probably not entitled to species rank. May be a garden hybrid or the little known Russian species, *Galanthus alpinus*, from the Caucasus. Broad leaves like *Galanthus elwesi*, but a dull yellow green. Difficult. Light shade, humus, and woodland conditions suit winter blooming snowdrops.

Policy Governing Awards

AMERICAN HORTICULTURAL SOCIETY

Although the original by-laws adopted by the American Horticultural Society in 1927 provided for a series of awards ranging from certificates to a gold medal, the only exercise of this authority, at least in recent years, has been to award a silver medal. Furthermore, within the ken of the author of this note and of his fellow members of the present Executive Committee this medal has been given, with only one exception, for award at Daffodil or Lily Shows of the Garden Club of Virginia. The exception was the National Chrysanthemum Show in 1957, when the Potomac Chrysanthemum Society was the host organization at the National Society's convention in Washington.

There seems to have been no basis, other than tradition, for favoring these shows to the apparent neglect of other distinguished horticultural exhibitions. With a view to adopting a comprehensive and impartial policy on awards, our President, Mr. Armstrong, requested the Standing Committee on Exhibitions and Awards to submit proposals to achieve these purposes. At the December, 1957 meeting of the Executive Committee the Awards Committee outlined a tentative plan of this nature and, after due consideration and some amendment, the plan was adopted at the following meeting in 1958.

In order that prospective applicants for the Society's medals or certificates may be informed as to the policy governing these awards, it is set forth in detail below. Needless to say, the policy is tentative and subject to further amendment if in its administration during the next year or two any serious deficiencies are disclosed.

From the AHS By-laws:

Article 13, Awards.

Section 1. The Society may award, in accordance with the importance and value of the exhibit or contribution to horticulture, Gold Medals, Silver Medals, Bronze Medals, First Class Certificates, Awards of Merit, Cultural Certificates, and other awards.

Section 2. The Society may recognize by suitable awards persons, corporations, or other institutions who or which have made great contributions to World Horticulture.

Statement of Policy.

1. The Executive Committee will grant, on behalf of the Board of Directors, the awards named in Section 1 of the By-laws with the exception of Gold Medals. All actions on awards by the Executive Committee will be based first on the recommendations of the Committee on Exhibitions and Awards.

2. The Executive Committee, with the advice of the Budget Committee, will authorize at the beginning of each calendar year an appropriation to cover the cost of such awards as it desires to offer during that year. The Committee on Awards will be limited to that amount in accepting applications and making recommendations for awards.

3. The Society will pay up to five dollars for suitable engraving of each medal award either to the organization sponsoring the show at which it is awarded or to the recipient of the medal. Certificate awards will be engrossed with the name of the recipient at the expense of the Society. These costs will be included in the allotment for awards.

4. Applications for awards must be made in writing, stating the name of the organization sponsoring the show, and its location and date; also the approximate number of classes in the show and the expected attendance, the title and description of the classes for which the awards are desired, and whether the judges are accredited by a national society representing the kinds of plants exhibited. Upon agreement by the Society to furnish the requested award the sponsoring organization must submit a copy of the show schedule for the Society's file.

5. The Committee on Exhibitions and Awards may exercise wide latitude in the selection of societies, shows, and classes which it recommends for awards, but the following suggestions are offered for its

guidance as reflecting the general policies of the American Horticultural Society.

For medal awards the exhibition should be to some extent regional, that is, sponsored by a national society or a federation or group of garden clubs.

Preference will be given to societies that are affiliated with the AHS, and to competitions that have an overall selective significance, such as sweepstakes, best-in-the-show, and collections.

These awards are intended for individual persons but the recipient may be an amateur horticulturist or represent a commercial organization provided that he exhibits in his own name.

Only classes that feature horticultural excellence will be considered.

Medals should not be awarded in the same class more than twice in succession, nor for more than three consecutive years in the same show.

6. The Gold Medal will not be awarded in response to an application but on the basis first of a recommendation by the Awards Committee, approved by the Executive Committee, and confirmed by a majority vote of the Board of Directors at a regular meeting or by a mail ballot.

7. Awards of the kind specified in Section 2 of the By-laws shall be made by the same procedure as that prescribed for the award of Gold Medals.

8. It will be the responsibility of the Committee on Exhibitions and Awards to investigate each year the propriety of making awards such as those contemplated by Section 2 of the By-laws, and also the Gold Medal, and to report its recommendations to the Executive Committee not later than its regular February meeting, so that action can be taken by this Committee in time to present it to the annual meeting of the Board of Directors.

FREEMAN A. WEISS
*Chairman of Committee on
Exhibitions and Awards*

A Book or Two

(Books designated "Library" are available for loan to the Membership)

The World in Your Garden.

Wendell H. Camp, Victor R. Boswell, John R. Magness, and Melville Bell Grosvenor. National Geographic Society, Washington 6, D. C. 1957. 231 pages. 80 full-page illustrations in color from paintings by Else Bostelmann. \$6.50. (Library).

The National Geographic Society has pooled articles written by three well-known plant scientists—a botanist, an olericulturist, and a pomologist—has decorated their thoughts with the paintings of Else Bostelmann and has ended up with an attractive publication on the origins of our garden plants. This volume should merit a place on the shelves of all gardeners both amateur and professional.

A part of the Society's "National Geographic Science Library," *The World in Your Garden* is based on three articles published in recent years by *The National Geographic Magazine*—"The World in Your Garden" by Dr. Camp (July, 1947), "Our Vegetable Travelers" by Dr. Boswell (August, 1949), and "How Fruit Came America" by Dr. Magness (September, 1951). For the person interested in the geographical origins of flowers, fruits and vegetables here can be found accurate and informative thumbnail sketches of most of our commoner cultivated plants. Melville Bell Grosvenor, editor of the magazine, has supplied a fine foreword on the romance of plant discovery, and as a bonus for the flower arranger there have been illustrated the nine basic designs of that art.

The colored illustrations are the backbone of this work. Into each of her 80 pages of plant portraits, Else Bostelmann has skillfully woven suggestions of the land of origin of her subjects. In only one of these has this reviewer noted any inaccuracy and this a very minor one:—our garden nasturtiums are not plants of lowland "South American Jungles" (plate opposite page 85), but rather are native to the cool Andean highlands and would have been better placed as companions with fuchsias on the preceding plate.

It is to be hoped that the success that surely should attend the appearance of this volume will demonstrate to the editors of the National Geographic Society that a little more attention might well be given blossoms (e.g. the plant kingdom) as opposed to the birds and bees (animal kingdom) which seem to receive more than their proportional attention in the fine publications of the Society.

W. H. HODGE

The Complete Book of Flowers and Plants for Interior Decoration.

Esther Wheeler and Anabel Combs Lasker. Hearthside Press, Inc., New York, New York. 1958. 189 pages. 140 halftones, 19 color plates, 60 drawings. \$7.95. (Library).

Primarily helpful to those who already have a good working knowledge of flower arranging techniques, this book supplies the necessary notes for correct placement of arrangement styles in a given location.

The outstanding decorating features of various English, American, European, and Oriental periods are described in detail and plant material types and arrangements are suggested for each era. This is useful for the individual home as well as for work in flower show exhibits. Sketches and photographs are generously utilized to illustrate the furnishings and flowers of these different times.

A goodly amount of research has obviously been done to bring together such exact information regarding the numerous methods of drying and preserving flowers, finishing and staining of drift-wood, making of plaques from dried materials and seeds, etc. Tips are also given as to the proper conditioning of garden and florist blooms, forcing of bulbs for winter cuttings, and plants to grow outdoors for ultimate indoor use.

Excellent photographs are used throughout to emphasize the information given in the text. Both artificial and living plant material is arranged artistically, rendering the book most instructive to anyone who is more than casually interested in flower arranging.

CAROL LANDA

The Guide to Garden Flowers.

Norman Taylor. Houghton Mifflin Company, Boston, Massachusetts. 1958. 315 pages, plus useful end papers. Illustrated in color and black and white. \$4.95.

There are relatively few books that are written for the intelligent beginner. This book is addressed to that audience. It has a definite plan, and that plan is clearly set forth by the author and very successfully carried out. The illustrations by Eduardo Salgado are beautiful and the color plates have a delicacy of execution that suggests water colors. In a few cases the color reproductions are a little too colorful, especially in the case of the pure blues and some of the purples. In a few cases, also, material was chosen that is not typical of the basic plant, as for example the Shasta Daisy that is

represented by one of the modern forms not the single form. In one case that of *Ornithogalum umbellatum*, the drawing is not correct, looking rather more like *O. nutans* which normally has no side inflorescence.

The text is particularly simple and clear and the technical terms are few and well explained, so they may become an immediate part of the beginner's vocabulary.

Perhaps the best feature of all, is the grouping by families with a brief and simple discussion so that the beginner may get the "feel" of a family and not be overwhelmed by a mere avalanche of names. There is a fairly wide range of material in the discussion, but as always in a modest volume, the widest limits are not included, since our huge country presents far too wide a range of plant growth and life to permit it.

There are indices and excellent cross references to text and illustration and to all the cross interests that should arise in the reading. In all, it is something that can be enjoyed by the beginner who has no thought to become a taxonomist or a professional horticulturist. Excellent.

B. Y. M.

A Summary of the Culture of California Plants at the Rancho Santa Ana Botanic Garden. 1927-1950.

Percy C. Everett. The Rancho Santa Ana Botanic Garden, Claremont, California. 1957. 223 pages, paper bound. \$3.50. (Library).

This title makes available in printed form information on the introduction, culture and propagation of the plants grown at the Rancho Santa Ana Botanic Garden during the first twenty-three years of its existence. This botanical garden was founded in 1926 by Susanna Bixby Bryant on a site in the Santa Ana Canyon in memory of her father, John W. Bixby, a California pioneer. The purpose of the garden has always been to grow and study native plants of California. In carrying out this purpose, nearly all of the plants brought into the garden were collected by the garden staff within the state. During the years 1926 through 1950 nearly 7,500 collections were handled at the garden; these included about 1,300 species and varieties, and of these about 1,000 kinds were established in 1950.

The accurate recording of data gained from growing plants brought into culture is one of the important functions of a botanical garden. This was realized at the time that the Rancho Santa Ana Botanic Garden was founded, when careful attention was given to planning a set of records. Information from these records is available, as in most other botanical gardens, to visitors who are able to come to the garden. This publication summarizes in book form the information brought together for all of the plants grown, whether they were successfully established or not, in the Rancho Santa Ana Botanic Garden on the site of the Santa Ana Canyon. Each plant is listed separately (alphabetically by genera) and for each species is given locality data, general information on culture, germination and propagation, nursery procedure, and success or failure under the conditions in the garden.

The amount of information given attests to the adequacy and completeness of the record system initially established and carried out. In 1950 the Rancho Santa Ana Botanic Garden was moved from the site in the Santa Ana Canyon to Claremont. Since the conditions at the new site were different from those on the old site, it was decided to limit the information presented in this publication to that obtained on the old site. This publication will surely prove to be a most valuable and useful reference on the culture of California native plants.

ELIZABETH MCCLINTOCK

Colour in the Winter Garden.

Graham Stuart Thomas. Phoenix House, Ltd., London, England, distributed by Charles T. Branford Company, Newton Centre 59, Massachusetts. 1957. 220 pages. 8 color plates, 52 line drawings. \$6.50. (Library).

To many persons the cold of winter makes all garden interest dormant; however, this need not be. Color and perhaps even some flowers may be found in the off seasons. A chapter is devoted to the major groups of plants with a discussion of those having color value. The autumn flowering cherry is suggested as a tree that flowers in late autumn or open winter weather as well as being suitable as a cut branch. The witch hazels provide small flowers in late autumn and winter, while other early flowering shrubs include *Lonicera fragrantissima*, *Salix* species and *Corylus*. Evergreen shrubs offer foliage color such as *Mahonia*, *Osmanthus*, and *Elaeagnus* or flowers as the *Camellia*. Many trees and shrubs provide color to the garden because of their bark color as the *Cornus*, *Betula* and *Platanus*. Foliage color is provided by shrubs and trees which have especial values during the winter as the *Ilex*, *Hedera* and perennials with foliage as *Helleborus* and *Liriope*. Berry color is provided by many for part or all of the winter by certain *Malus*, *Cotoneaster*, *Crataegus* or *Euonymus*. Herbaceous perennials may flower as species of *Viola*, *Saxifraga* and *Adonis*. Bulbous plants adding color include those as certain *Iris*, *Colchicum*, *Eranthis* and *Narcissus*. Other chapters are devoted to some of the kinds of plants that have many species useful for these winter values, as chapters on the Heathers, *Rhododendron*, *Crocus* and Snowdrops.

The author closes the book with suggestions on planning and using such plants in the garden, and ends the book with an excellent table listing the plants, with species and variety showing size, flowering period, color, time of planting and the planting distance. This is most helpful.

An excellent book, and one to stimulate garden interest the year round. You may feel the author has gone over into early spring somewhat but the dividing line between winter and spring is surely not a sharp one. While the book has been written with England as its background, the same plants may be grown in the United States.

Mr. Thomas is the author of *The Old Shrub Roses* (reviewed in July 1956) and is well known for his fine pen and ink, as well as for his water colored, drawings—over 50 of which are found in the current book.

C. B. L.

Nature's Wonders in Full Color.

Charles L. Sherman (Introduction by Robert S. Lemmon). Hanover House, Garden City, New York. 1956. 252 pages. Illustrated. \$7.50.

The National Audubon Society and Nelson Doubleday, Inc., launched the Audubon Nature Program in 1953. This consisted of a small pamphlet on a different nature topic being sent out by mail each month to subscribers, accompanied by a large sheet of color nature stamps which one either pasted into the proper box in the pamphlet and lost the pamphlet, or used for sealing their correspondence envelopes.

Since this method of preserving the stamps was less permanent than the publishers desired, this book assembled all the previous pamphlets and their illustrations in a permanent cloth bound book. There are 14 subjects treated in the book, ranging from the Animal Children to Birds of Prey. Plants get their mention in Seeds and Seed Pods, Favorite Wild Flowers, etc. There is a very interesting chapter on nature color photographs. Very good photographs are exhibited as will anyone know who is familiar with these from the stamp days.

Gardening In Containers.

Henry Teuscher, Guest Editor, Brooklyn Botanic Garden, Brooklyn 25, New York. *Plants & Gardens*, Vol. 14, No. 1, 1958. 80 pages. Illustrated. \$1.00.

The Brooklyn Botanic Garden is located in a city that has grown more and more closely about it and the theme of this booklet possibly comes closer to a city basis of operation than any other handbook from the garden.

It is an excellent volume for any one concerned with the growing of plants that are not in the garden but in containers of one sort or another. It ranges from roof gardens, to those particular roof gardens planted over underground garage areas to all the smaller bits of earth that one might conceive, even those that parallel the "miniature" forms of flower arrangement, a field of expression that seems to have a particular fascination for certain types of mind.

Mr. Teuscher and his associates have presented the case on the background of personal experience, and in the texts one will find, if he looks, all the elements that make for difficulty and for success. The texts are particularly sound in stressing these elements, and show by inference that there is a new type of labor, and a different cost element to be considered.

The only thing that is not treated is a discussion of flower pots of the ordinary sort, of clay, but in designs that are more decorative than the familiar unit, that was designed for convenience in nursery and greenhouse use, namely a unit that could be stacked or nested when not in use. There are available any number of flower pots that are beautiful expressions of the craftsman's art and skill, and they are just as splendid as the boxes and what nots that are depicted.

Plant materials are considered only as related to the problems discussed, and to the sites where the work was done. The basis of choice in each case is clear enough.

Interesting and diverting but not for all of us, and for those who do undertake it, one word of warning: look up the ordinances of your particular town to see what safety elements have to be considered from danger of falling. B. Y. M.

Ferns and Fern Allies of Texas.

Donovan S. Correll, Texas Research Foundation, Renner, Texas. (*Contributions from Texas Research Foundation, Volume 2 of a Series of Botanical Studies*, edited by Cyrus Longworth Lundell) 1956. 188 pages. 38 plates from pen and ink drawings of Miss Jane W. Roller. \$5.50. (Library).

This is essentially a manual for the botanist or serious student of the ferns of Texas, a state whose fern flora is richer (107 species) than any other state with the exception of Florida. It is hardly a volume for the horticulturally minded though two pages of the introduction are devoted in a general way to the propagation and cultivation of ferns including brief recommendations of some Texas species for gardeners.

As a botanical contribution the volume stands as another example of the careful and scholarly work that one expects from Dr. Correll. A noteworthy thing and something to be recommended for similar groups to consider is the sponsorship of this volume by the Dallas Garden Club. What finer or more permanent thing could a garden club do than to lend financial support to such a useful scientific publication?

W. H. Hodge

African Violets, Gloxinias, and Their Relatives.

(*A Guide to the Cultivated Gesneriads*.) Harold E. Moore, Jr. The Macmillan Company, New York, New York. 1957. 323 pages. 5 color plates, 40+ line drawings by Marion Ruff Sheehan. \$10.00. (Library).

Don't let the large print on the dust cover stressing the African Violets fool you. This book covers this genus of plants as one among the many other Gesneriads in a scholarly and interesting manner. It must be stressed that this volume does not profess to give a complete coverage of the whole family of Gesneriads. Rather the author has only given material on the species obtainable in the United States. Rare species only recently introduced and still seen only in botanical gardens may not be described, but certainly the range of material described and illustrated should be sufficient for the most avid collector with facilities for growing this varied family of plants.

Chapters range through ecology ("Gesneriads at Home"), culture, propagation, pests and diseases and hybrids. Each subject is thoroughly outlined and sufficient interesting information is given for both the professional and amateur to grow these plants. These phases of the subject are covered in the first part of the book, the second part being devoted to the kinds of Gesneriads. A necessarily artificial arrangement of the genera is made which should make it

fairly easy to identify unknown plants. The confusion of names in both named varieties and species, as well as shifts in species from one genus to another will require the reader to go through this section carefully in identifying an unknown plant. This is a pleasure, for illustrations both in color and black-and-white are excellent and make the job as easy as possible.

A great help in tracking down names as well as the meaning of the names lies in the third part of this book. A series of five appendices covers names, their pronunciations and meanings, chromosome numbers, references, and a glossary of botanical terms used in the text.

This book could serve as a model for those writing on a particular family or genus of plants. So often such works are sketchy and leave much to be answered. Other than the fact that other new species will probably be introduced into the United States this book will be a "must" for anyone interested in Gesneriads for some years to come.

FREDERICK W. COE

camellias from first-hand experience. His "down to earth" remarks will be understood by everyone.

Among the other interesting articles in this yearbook are an account of the effect of the 1955 freeze on rhododendrons in our Pacific Northwest, and "Camellias at Tiraru, New Zealand."

F. de V.

The Lily Yearbook 1958.

P. M. Syng and Miss G. E. Peterson, editors. Royal Horticultural Society, London, England. 1958. 157 pages, 37 illustrations. \$1.65.

This is the twenty-first yearbook in a noteworthy series started in 1932. The book is dedicated to the late Frank Kingdon-Ward, the great English plant explorer who died April 8th and contains an account of his lily finds.

Several accounts of lilies in English gardens as well as several from North America are the principal features of the book. Jan de Graaff presents his ideas on the commercial production of hybrid lilies. The discussion of *Erythroniums* should appeal to American gardeners. Many of the illustrations are of new lilies.

GEORGE L. SLATE

The Rhododendron and Camellia Yearbook, 1958.

N. K. Gould, G. E. Peterson, and P. M. Syng. Editors. Royal Horticultural Society, London, England. 1957. 120 pages. Illustrated. \$1.65.

There is much of interest in this yearbook for rhododendron and camelia enthusiasts in this country. The interesting account of the birth, life and demise of the English Rhododendron Society by G. H. Johnstone is a veritable roll-call of famous names long associated with this genus.

The article on "The Gardens on the Isle of Gigha" should be of particular interest to persons in the climatically similar Puget Sound area. This island on the west coast of Scotland seldom records temperatures below 26°F., has cool summers, and an annual rainfall of from 33 to 55 inches. The use of olearias, escallonias, and griselinias as wind resisters to protect the rhododendrons and camellias attests to the mildness of the climate. The fact that *Camellia japonica* only flowers well when in the sun indicates that summer temperatures are quite cool.

Donald Waterer, in his succinctly stated comments on Ghent Azaleas, reminds his countrymen what they are missing if they are not growing some of the Ghents. His recommended list includes some of the varieties that are doing well as far south as the U.S. National Arboretum in Washington, D.C.

An article on "Confusion in Camellia Nomenclature" clearly presents how this confusion has come about and what we should do to clear it up.

Mr. Frederic Heutte's comments on "Camellias in Virginia," should be of particular interest to everyone interested in growing camellias on the East Coast. Singularly responsible for the development of the outstanding camellia collection of over 500 varieties at the Norfolk Municipal Gardens, Norfolk, Virginia, he has developed a vast reservoir of knowledge on

The House Beautiful Book of Gardens and Outdoor Living.

Joseph E. Howland. Doubleday & Company, Inc., New York, New York. 1958. 376 pages. Illustrated. \$10.00.

Probably most places in the world have been visited by *House Beautiful Magazine* and the readers of the past five or six years are very familiar with the meritorious photographic work of Dr. Howland—and 24 other prominent house and garden photographers, among which would be Maynard Parker)—as well as his commanding writings on garden subjects.

This generous size book measuring 9 x 12.5 inches uses many of the illustrations and themes long remembered from previous magazines and books and adds a host of others not seen elsewhere before. In the book, however, the illustrations are grouped under seventeen headings, treating: A new approach to garden designing, Gardens work for us, Plan for a permanent garden, Flowers without hard work, Using plants with style, Remodeling the old garden, and the like, and without the preceding 134 pages of advertising.

The explanatory pictures—it is virtually a pictorial effort and beautifully planned: 106 in color, 800 in black-and-white—often do have a line or so of type. One may read or just look and look with wishful dreams and plans for that some-day-when . . . The houses and gardens used exhibit the spirit of such names as Baylis, Marie & Arthur Berger, Church, Deering, Eckbo, Goodman, Breeley, Osmundson & Staley, Shurcliff & Shurcliff, Wright—a total of 97.

While one is catching up on the back-log of garden books hashing and rehashing the same old theme, this one will afford a welcomed interlude in the parade and give you relaxation, imagination, and stimulation.

Editing the Small Magazine.

Rowena Ferguson. Columbia University Press, New York, New York. 1958. 271 pages. Illustrated. \$4.50.

Garden clubbers, yearbookers, church workers, special plant society editors, newsgatherers, et al.—here for the first time, to this reviewer's knowledge, is a handbook that will help you do all the writing, soliciting manuscripts, planning, editing, proofing, make-up, and the thousands of other usual details you should know but have never been able to learn, to make your printing a success.

The book will help you to solve any of the mechanical problems you may have in getting to the finished product. (It does not treat nomenclatural or scientific editing of any one particular subject.)

Miss Ferguson is Associate Editor of the large Methodist Publishing House. She knows of all the problems involved in publishing the small magazine and house journals and she generously passes the knowledge along to the reader.

There are 12,000 periodicals of various types in the United States alone, and at least 95 per cent of these are small! Have no sudden disturbing feeling in the mind about your publication problem and run out for Miss Ferguson's seasoned advice—now.

Hardy Perennials.

Alan Bloom. Faber and Faber, Ltd., London, England. 1957. 304 pages. Illustrated. \$6.00.

This is a comprehensive volume written for the amateur and professional gardener. The first part of the book discusses the culture and uses of perennials. Since this book was written from an English point of view and conditions, some of the cultural details will not apply to our American ways of gardening. These differences can be adjusted to our conditions and do not seriously detract from its value to those interested in perennials. There are separate chapters on the planning and planting of perennials in a midget border, a double-sided border, one-sided border or those specialized as to color, or a seasonal one, a scented one or those of a favorite flower. These chapters suggest kinds of perennials; their placement; and combination and conditions where a perennial border should be developed. One chapter emphasizes perennials for cutting including those suitable for commercial cut flower use.

To the American reader, the second half of this book will be of greatest value. Here are listed perennials, alphabetically from *Acanthus* to *Zauschneria*. For each genus there is a brief discussion of the group. This is followed by short notes on the characteristics of that plant with short notes on each of the species discussed. Some readers may be surprised to find many varieties of our native *Asters* and even more so the species and varieties of *Goldenrod*, a native perennial that has been neglected by American gardeners. A most complete book on perennials.

C. B. L.

The Japanese Art of Miniature Trees and Landscapes.

Yuji Yoshimura and Giovanna M. Halford. Charles E. Tuttle Company, Rutland, Vermont and Tokyo, Japan. 1957. 220 pages. 25 color plates, 245 halftones, 42 explanatory diagrams. \$7.50. (Library).

This art, which has been of interest to the reviewer for years, has been the subject of several books and numerous articles in the years following World War II. None of these has done such a thorough job of description and illustrations as the present volume. Many of the articles written do not emphasize the nature or the extent of the care needed for these small trees. The authors of this volume stress the fact that rather than being another pot plant to be cared for at the whim of the grower, the "bonsai" are more like a pet animal which needs constant care to remain in good health. An artistic sense is also needed to create and maintain fine examples of bonsai. Both of these factors should certainly make the potential grower pause before getting seriously involved in this hobby.

This is a beautifully constructed volume which carefully presents in words and in line drawings, black and white and colored illustrations all of the methods of creating and maintaining miniature trees. Every aspect of culture is well covered and to further help in growing individual species a series of appendices listing a great number of species is found in the back of the book. Names are given in English, Japanese transliteration, Japanese characters and in Latin.

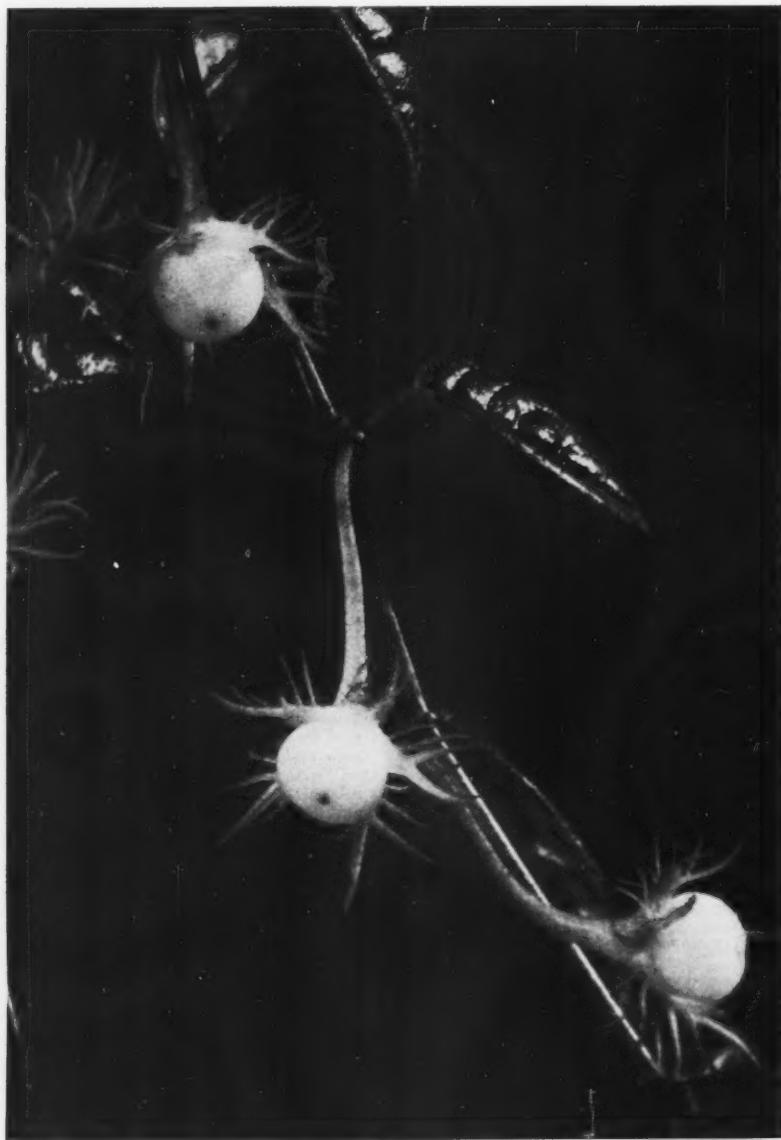
Few faults can be found with this book. The reviewer was a little puzzled at the reference to "English holly" which is most commonly thought of as *Ilex aquifolium*. The species referred to in this volume is *Ilex serrata* var. *sieboldii* and I can find no authority for calling this Japanese species an "English holly." Perhaps this minor error escaped the authors in compiling this excellent book, for certainly in every other respect it seems exemplary.

FREDERICK W. COE

Note: Members of the Society may purchase copies of *The Japanese Art of Miniature Trees and Landscape* at the reduced price of \$6.37 a copy, postage and packing free.

Send orders accompanied by payment to American Horticultural Society, 1600 Bladensburg Road, Northeast, Washington 2, D. C.

Allow two weeks for delivery.



R. MELOCHE, Montreal Botanical Garden

Fruit of Trichantha minor, the rare Gesneriad from Ecuador

The Gardeners' Pocketbook

The Christine Buisman Elm

The Christine Buisman elm is highly resistant to, but not immune from, the fungus-caused Dutch elm disease and immune from the virus-caused phloem necrosis. Dr. Christine Buisman, a plant pathologist working at the Willie Commelin Scholten Laboratorium at Baarn, the Netherlands, selected the resistant young tree from a lot of seedlings grown from seed collected in Spain. In her research on Dutch elm disease Dr. Buisman inoculated large numbers of young elms with the causal fungus before she found the seedling named posthumously in her honor.

The U. S. Department of Agriculture imported stock of the selection in 1938. Critical testing in the United States confirmed its high resistance to Dutch elm disease and demonstrated its immunity from phloem necrosis.

The stock was propagated at first slowly by layering and later, after some research, more rapidly by root cuttings. Young trees were distributed to cooperating agricultural experiment stations and colleges and to some cities in eastern United States. Reports from the cooperators indicate that the selection has grown satisfactorily from Boston southward to Washington, D. C., and in the mid-west. Its hardiness in the more northern states, such as Minnesota, is questionable.

The Christine Buisman elm is a selection of the European field elm, *Ulmus carpinifolia*. It may be expected to have eventually the typical form of that species. The oldest trees in the United States are not yet mature. In the Netherlands the selection is attacked by *nectria* canker, but this disease has not affected the selection in this country.

Stock of the selection was distributed to nurserymen several years ago and is now available in the trade.—CURTIS MAY, Pathologist, Crops Research Division, United States Department of Agriculture, Beltsville, Maryland.

Trichantha minor

During my trip to Ecuador in the spring of 1956, I collected and sent home to Montreal, besides many orchids and other plants, also living material of a Gesneriad which I found in wet, moss-covered woods at an intermediate altitude of 3,400 ft. The locality was near the road Cuenca-Guayaquil, on the Pacific slope of the Andes, probably not more than 20 or 25 road-miles beyond the town of Ducur when coming from Cuenca. It is not possible to nail down the locality more closely than that, because the road winds and curves interminably and the best map of Ecuador so far is still very unreliable. The town of Ducur, though of fair size for Ecuador, is not even shown on this map.

The plants were rambling about, partly on the ground over rotting tree trunks, partly on moss-covered branches with some of the shoots hanging down free. There were neither flowers nor fruits, but from the manner of its growth I was sure that this was a Gesneriad which I had never seen before. Therefore I wanted it, but, no matter how I searched, I could not find a single plant with a real root system. The yard-long shoots, rambling about in the moss, had only rudimentary roots, and I never managed to trace one down to the ground. Finally, I cut off several long shoots, wrapping them in moist moss and paper. In this manner they travelled to Montreal, and I gave them only a very slim chance for survival. When they arrived, their leaves had dropped off, and they looked like dead sticks, but they were laid down on moist sphagnum moss and, when I returned home, I saw to my pleasure that some of them were producing new young shoots. These shoots we used as cuttings, and from them we raised the plant shown on the accompanying photograph.

It started to flower last summer and continued to do so heavily for over four months. Thus we were enabled to de-

termine it as *Trichantha minor*, which does not appear to be in cultivation elsewhere at present, except with a few people to whom we have given cuttings. The species has been introduced once before though. In 1861, a Mr. R. Pearce who was collecting for the nursery of Veitch sent living material, probably seeds, to England. His letter, accompanying his shipment was dated from Guayaquil but it gave no exact locality for this plant. Since he had travelled widely, there was no telling where he might have found this trichantha. The *Curtis Botanical Magazine*, Vol. XC, t. 5428 (published 1864) shows a colored plate of *Trichantha minor* which leaves no doubt of the identity of our plant. On this plate, however, as well as according to the descriptions given elsewhere, the face of the corolla is entirely yellowed while on our plant the two upper lobes of the corolla are almost black. Therefore, we are inclined to consider our plant as a variety of *Trichantha minor*.

This is a magnificent basket plant, as curious as it is handsome. The shiny, blackish green leaves with fimbriate margins and reddish veins underneath form an effective background for the red-hairy pedicels, the bristly red calyces and the dark purple, 4 cm. long tubular flowers with their yellow and black faces. Five curious yellow horns with small hairs on their thickened tips add further interest to the open face of the corolla. The botanical description says that the calyx is five-lobed. One has to take a very close look however, to recognize any lobes at all, because they are irregularly fused with the fleshy calyx all over its outer surface. There may be five or six such lobes and each one is again deeply divided into many linear spreading sections, so that the effect is that of long, red-hairy bristles all over the calyx.

Very curious also is the sexual arrangement within the flower which includes a special mechanism to prevent self-fertilization. The four stamens (containing the pollen) which are partly fused in horizontal rows ripen first but last only for about one day. Then they are withdrawn into the corolla tube through spiralling of their filament. The style lengthens after the stamens have disappeared and the bifid (two-parted) stigma opens up only then. In consequence, the flowers of *Trichantha minor* never

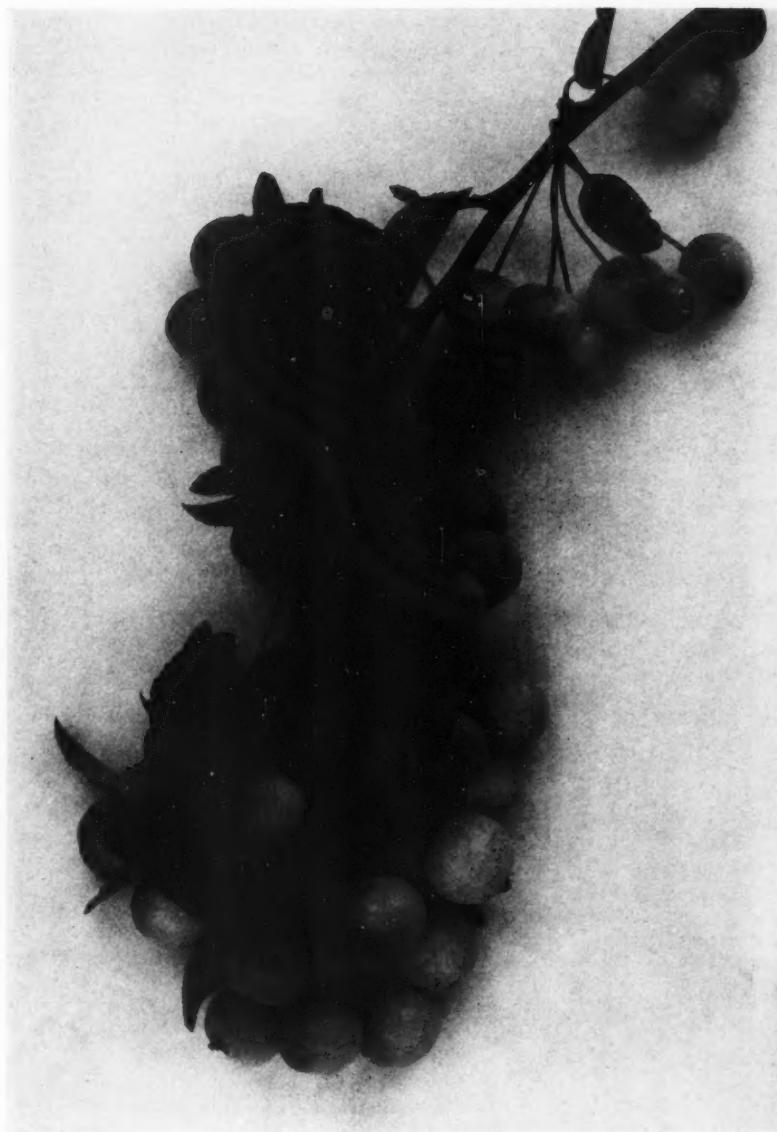
set seeds by themselves which may be in part responsible for the fact that the species did not remain in cultivation very long after its introduction in 1861. Even the botanical description says: "fruit unknown." We have pollinated the flowers of our plant regularly every morning for two weeks with a fine brush, and in this manner were able to induce the setting of over two dozen fruits. These took four months to develop fully into globular berries, 1 cm. in diameter, and turned milk-white on ripening. The accompanying photograph undoubtedly is the first to be published of the fruits of *Trichantha minor*. We expect to distribute the seeds freely, and we hope that this will serve to assure the future permanence in cultivation of this handsome and interesting plant.—HENRY TEUSCHER, Curator, Montreal Botanical Garden.

Malus 'Dorothea'

This beautiful hybrid seedling was found in bloom in the Arnold Arboretum at Jamaica Plain, Massachusetts, as a chance seedling on May 17, 1943. Because of its beautiful flowers and its excellent fruits, I later named it Dorothea in honor of my older daughter.

In habit and size, it is apparently close to *Malus arnoldiana*, for it is very rounded and dense branching. Older plants have not yet grown much over ten feet, so it will be one of the lower growing crab apples. The flowers are about two inches in diameter, being semi-double to double and having up to sixteen petals. They are colored a good flush pink, about the same color as those of the taller growing Bechtel Crab, the flower buds being red.

There are none too many double-flowered crab apples, one of several reasons why this variety is of much value, for the plants with double flowers, of course, remain colorfully effective in the garden longer than the single-flowered varieties. Dorothea starts to bloom while still very young, sometimes even the first year after it has been grafted. This gives it an added advantage in the eyes of the commercial producer, who likes to have early blooming plants, for these help to make early sales and a quicker turnover.



ARNOLD ARBORETUM

Fruits of Malus 'Dorothea'

The fruits are bright yellow, slightly over one-half inch in diameter. There are only a few bright-yellow-fruited crab apples, and no other double-flowered variety can boast having outstandingly colored yellow fruits. This is another reason why this variety is valued. The

fruits begin to color in early October and may remain on the tree well into the winter, turning brown, of course, after repeated freezes, but still available as food for the birds for a long period in the later fall and early winter.

Still another factor in its favor is that

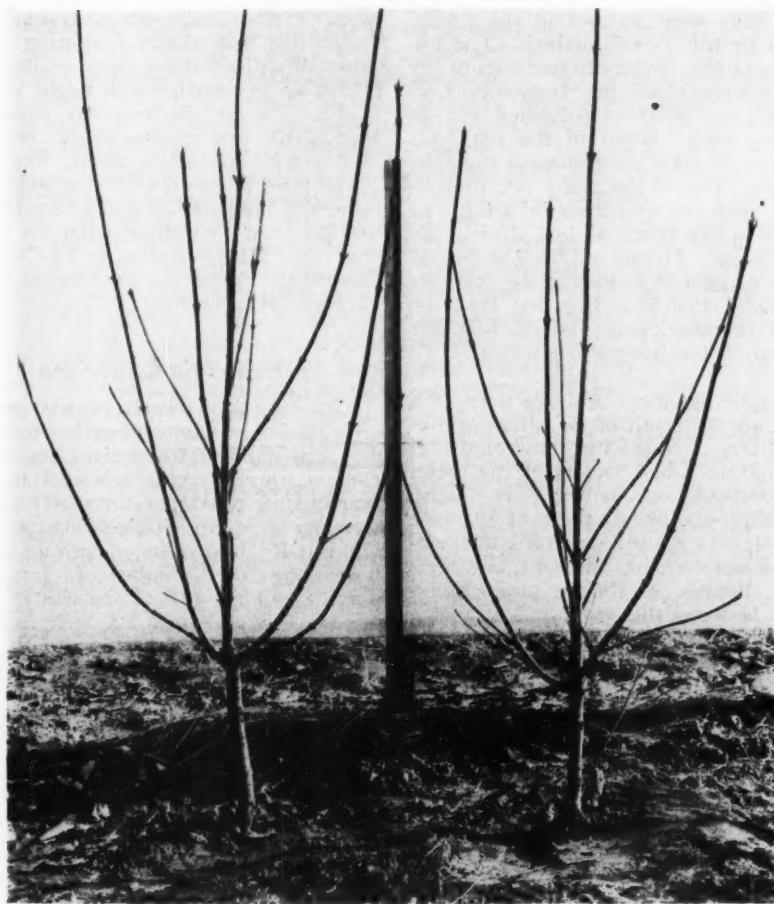


ARNOLD ARBORETUM

Malus 'Dorothea' semi-double to double flower

it bears profuse flowers and fruits every year, something which cannot be said of all the crab apples. The time has come for us to be much more selective in the varieties grown, since there are over 200 available now from commercial sources. Those which should be used the most

should have good flowers, colorful fruits and be depended upon to bloom every year. *Malus Dorothea* has all these attributes, which go to make it a very desirable variety for featuring in garden or park, wherever colorful, small-flowering trees are desired.—DONALD WYMAN, Arnold Arboretum, Jamaica Plain, Mass.



U. S. NATIONAL ARBORETUM

43 inches—first year's growth of grafted *Cornus nuttalli*

Performance of Grafted Pacific Dogwood in the East

Pacific Dogwood, *Cornus nuttalli*, at the United States National Arboretum, now looks promising for use in the display collections and as potential breeding material. Previously, because of some critical environmental conditions, seedlings and cuttings varied greatly in their growth response. Alfred Rehder and Donald Wyman, of the Arnold Arboretum, have both reported poor performance of Pacific Dogwood in the Eastern States.

In a preliminary effort to test vegetative propagation from Pacific Dogwood plants established in the Eastern States, scions were obtained from a specimen located in the Morris Arboretum of the University of Pennsylvania. The scions were received July 13, 1956, and 10 soft-wood cuttings treated with Hormodin 3 were placed in a sand-peat mixture under intermittent mist in a greenhouse bench. Only one cutting rooted and at present it is 8 inches high.

On the same date bud grafts of the Morris Arboretum material were tried.

Ten buds were inserted in the understocks by the T-bud method. The understocks were 3-year-old seedlings of the Yellowberry Flowering Dogwood, *Cornus florida xanthocarpa*, lined out in nursery rows. Seven of the ten buds united and made exceptionally vigorous growth. Two of the grafts (see illustration) averaged 43 inches from the bud union to the terminal bud during the first season. The united buds withstood a low of plus 1° F. during the previous winter of 1956-57. The first year the grafts produced many lateral branches instead of remaining single whips.

The development and reactions of a plant are the result of the interaction of hereditary factors and environmental conditions. Chief factors of the aerial environment are temperature, light, humidity, and wind; those of the root environment are soil structure, temperature, water content, nutrients, and aeration. Because of the reciprocal influences between the roots and the tops, the development of the tops is directly reflected in the behavior of the roots and vice versa.

The understock of Yellowberry Flowering Dogwood furnished the root system for the bud grafted plants of the Pacific Dogwood. The Yellowberry Flowering Dogwood is a botanical variety of our ordinary dogwood, *Cornus florida*, which is native over an extensive range in the eastern United States and is hardy into Zone 4. Through a long evolutionary process its root system has adapted itself to a peculiar root environment as much as its top has adapted itself to a peculiar aerial environment.

Pacific Dogwood, native along a narrow strip of the West Coast and hardy in Zone 7, must adjust the physiological processes of both its roots and tops to survive under the environmental conditions of the eastern United States. Limiting factors acting independently or in combination determine its development in the new environment. Therefore

when Pacific Dogwood is grafted on compatible Yellowberry Flowering Dogwood about half of the possible limiting factors are removed, which might be an explanation for the vigorous performance of the grafted plants. No conclusions can be reached, however, until the initial vigor due to the older established rootstocks has subsided and an equilibrium has been effected between the tops and the roots.—WILLIAM F. KOSAR, *Geneticist, United States National Arboretum, Washington, D. C.*

Sternbergia fischeriana

This little-known species is well worth growing for its winter flowering tendency. The narcissus-like foliage begins to elongate in this region around the new year in spite of temperatures well below freezing. Buds are visible soon after this and usually show color or even an open flower by the middle of January. Throughout the rest of the winter one or two funnel-shaped 2-3 inch flowers are usually open if the day is sunny and the temperature is above freezing. A clump of several bulbs will have a blooming period of two months or more in the middle of winter.

The flower is identical in appearance with the much better known fall-blooming *S. lutea*, which in turn looks very much like a good sized yellow crocus elevated on a short stem. The foliage differs from the latter species in resembling that of a large-leaved narcissus without the bluish-grey bloom.

S. fischeriana is a native of the Caucasus and should be treated much as a narcissus in planting the bulbs. The foliage dies back in June and clumps may be divided in a manner similar to narcissus which the bulbs resemble.

This is the only so-called "spring" blooming species in this genus. The other three species (*S. lutea, colchiflora* and *macrantha*) are autumnal.—FREDERICK W. COE, *Bethesda, Maryland*.

Organizations Affiliated With The American Horticultural Society

- American Association of Nurserymen
- American Begonia Society
- American Begonia Society, San Francisco Branch
- American Camellia Society
- American Daffodil Society
- American Gloxinia Society
- American Hibiscus Society
- American Iris Society
- American Peony Society
- American Rhododendron Society
- American Rhododendron Society, Middle Atlantic Chapter
- American Rose Society
- Bethesda Community Garden Club (Maryland)
- Birmingham Horticultural Society (Alabama)
 - California Garden Clubs, Inc.
 - California Horticultural Society
- Central Florida Horticultural Society (Orlando)
- Chester Horticultural Society (Virginia)
 - Chevy Chase (D. C.) Garden Club
 - Garden Center of Greater Cincinnati
 - Garden Center of Greater Cleveland
 - Garden Club of Alexandria (Virginia)
 - Garden Club of Chevy Chase, Maryland
 - Garden Club of Danville (Virginia)
 - Garden Club of Fairfax (Virginia)
 - Garden Club of Montclair (New Jersey)
 - Garden Club of Virginia
- Garden Study Club, Delray Beach, Florida
 - Georgetown Garden Club (D. C.)
 - Herb Society of America
 - Holly Society of America
- Houston Horticultural Society
- Hunting Creek (Alexandria, Virginia) Garden Club
 - International Geranium Society
 - Iowa State Horticultural Society
 - Kenwood Garden Club (Maryland)
- La Salle Horticultural Society (Montreal)
- Manitowoc Men's Garden Club (Wisconsin)
- Men's Garden Club of Fairfield County (Connecticut)
- Men's Garden Club of Montgomery County (Maryland)
 - Michigan Horticultural Society
 - Midwest Horticultural Society
- Moline (Illinois) Horticultural Society, Inc.
 - National Association of Gardeners
 - National Capital Garden Club League
- National Landscape Nurserymen's Association
 - Neighborhood Garden Club (Virginia)
- New England Wild Flower Preservation Society
 - New Orleans Garden Society, Inc.
 - New Orleans Horticultural Study Club
 - North American Lily Society
- Northern Nut Growers' Association, Inc.
 - Ohio Association of Garden Clubs
 - Pennsylvania Horticultural Society
 - Perennial Garden Club (D. C.)
- Pittsburgh Garden Center
- Plainfield Garden Club (New Jersey)
 - Potomac Rose Society (D. C.)
 - San Francisco Garden Club
- Seven Seas Garden Club (Maryland)
- Southern California Camellia Society
- Takoma Horticultural Club (Maryland-D. C.)
 - Waterfront Garden Club (Alabama)
- Worcester County Horticultural Society (Massachusetts)



Pencil drawing of a few *Muscari* bulbs

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